ARCHIVES OF OPHTHALMOLOGY.

THE SIGNIFICANCE OF CONSTRICTIONS AND DILATATIONS IN THE CALIBRE OF RETINAL ARTERIES.

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(*With one drawing.*)

NOWHERE else in the human body can the circulation of the blood be observed with the clearness with which it is presented to us in the retina. The vessels of the retina can be distinctly seen with the ophthalmoscope through the transparent media of the eyeball; the latter not only offer no impediment to our gaze but even aid our sight by acting as magnifying lenses, enlarging the object many times. The walls of the retinal vessels are perfectly transparent, having the same refractive index as the retina and are therefore invisible. What we see is not the vessel but the column of blood contained in it. Its size is the index of the calibre of the blood-vessel. The normal retinal blood-vessels vary considerably in size, but it is not difficult in most cases to draw the line between the normal and the congested, on the one hand, and the abnormally narrow on the other. The healthy retinal blood-vessel has its greatest calibre at the papilla and gradually and almost imperceptibly becomes narrower toward the periphery, excepting at those points where divisions take place; here each of the branches has a diameter smaller than that of the main trunk. The course of the arteries is in more or less straight lines and in infrequent curves.

In the cases which are described below there are peculiar variations in the calibre of the arteries which have the ap-

pearance of constrictions. Thus an artery may start at the papilla with a narrow calibre, become wider for a short distance, then narrower again and so on into the periphery. The constrictions may be slight, or they may be so great as to cause the vessels to disappear entirely; and the intervening spaces may by contrast appear as aneurismal dilatations.

A few years ago I reported[1] the results of the ophthalmoscopic examination of a number of cases of *arterial sclerosis* which had been studied carefully by Dr. G. J. Preston and myself.

"Of the 40 retinæ examined 19 presented decided local or general narrowing of the arteries with frequent tortuosity (12 patients); 10 presented moderate or slight changes of the same kind (7 patients); 4 presented whitish margins along the arteries (2 patients); 1 had a hemorrhage on the papilla; 7 appeared thoroughly normal (5 patients); in 2 the arteries appeared normal but there were other extensive retinal changes. Besides these I noted, in several cases, senile changes in the characteristic little yellowish spots due to colloid degeneration of the lamina vitrea of the choroid." These results were in harmony with those of Raehlmann, and of Hirschberg, to whose publications reference was made in the above paper. The pathological change producing the local or general narrowing of the arteries is a hyaline thickening of the vessel-wall, as will be seen below.

It is a matter of no little interest that we find the localized narrowings described above, in varied conditions. For a number of years I have noted all the cases in which these changes were found and the following embodies the results of a study of these cases. The number of these cases is thirty-three which does not include those which were the basis of the paper referred to above.

ARTERIO-SCLEROSIS.

In 26 cases there was a greater or less degree of general arterio-sclerosis. These patients ranged from forty-five to seventy-five years of age, with the exception of two who

[1] *Journal of the Amer. Med. Assoc.*, May 2, 1891.

were thirty-eight, but one of these likewise had a decided cardiac affection. The affection of the vessels was often associated with other senile changes, such as beginning cataract, central retinal atrophy, and especially colloid excrescences.

CASE 1.—Mrs. B., a very old lady (age not noted); general arterio-sclerosis. Vision somewhat impaired. Optic papillæ pale (as often seen in old age) and arteries narrow in the indirect image. Upright image of left eye shows decided variations in the calibre of the arteries: The superior nasal artery begins as a fine line; about ½ P.D. from the margin of the papilla, it swells out to double its original size. The inferior temporal artery has a white border near the edge of papilla, where it is very thin. A branch of the inferior temporal artery going directly downward becomes invisible for a short distance. The nasal branches are very thin. The veins throughout are normal. Scattered about we find a few colloid excrescences. The upright image of the right retinal vessels presents a similar picture. The superior temporal artery is thin in its papillary portion and has a number of constrictions near the papilla. One branch is about twice as wide 1 P.D. from papillary border as it is on the papilla. The superior nasal artery is very fine throughout. A branch of inferior nasal artery has white borders for a short distance and at one point becomes almost invisible. The inferior temporal artery has a slight constriction.

CASE 2.—J. V. P., aged sixty-four: general arterio-sclerosis. Denies syphilis. Had an apoplectic attack in 1891 resulting in *left hemiplegia* (speech was slightly affected but recovered). Ophthalmoscopic examination: Color of the papillæ good. Distinct constrictions in the calibre of the arteries. Arterial pulsation very decided (narrowing and dilatation of the arterial reflex and locomotion of the vessels). The arterial pulsation indicated insufficiency of the aortic valves and subsequent auscultation by Dr. Julius Friedenwald proved this to be correct; the constriction of the arteries was an evidence of arterio-sclerosis and the apoplectic attack depended upon this.

CASE 3.—J. H. T., aged fifty-eight, but apparently older, a picture of premature senility, was under observation for a year. Arterio-sclerosis: high tension, radial pulse. Marked failure of memory and slight aphasia; heart sounds normal; urine normal. A simple inspection of the inverted ophthalmoscopic image of the

retina does not reveal any changes. But on examining with the direct method we find great variations in the calibre of blood-vessels. Thus the arteria temporalis superior begins as a narrow vessel; near the papilla it becomes still finer, then widens out to twice its original size. The variations in the inferior temporal artery are very marked; 1 P. D. from the papilla, it is almost lost to view; then it widens for the distance of 1 P. D. to three times its previous size; it then rapidly becomes narrower, giving off two branches, and then is widened again. All the arteries show these variations in calibre. Still the vision is very good.

Case 4.—J. McG., aged sixty-three; arterio-sclerosis; radials very hard. The retinal arteries present many and marked constrictions in their course. The right superior temporal begins as a fine artery; leaving the papilla it curves around and becomes twice as wide; retaining this calibre for a distance of $\frac{1}{2}$ P. D. it again becomes narrow, making another curve, and continues to repeat this several times. In the left eye the variations in calibre are still more marked.

Case 5.—M. B., aged sixty; arterio-sclerosis. In both eyes there is central senile retinal atrophy. The retinal arteries are tortuous and show decided variations in calibre.

Case 6.—F. K., aged sixty-two; peripheral neuritis and general arterio-sclerosis. Service of Dr. Preston at the City Hospital. Respiratory, circulatory, urinary, and digestive organs normal; slight ataxia. Knee-jerk lost at first, returned after a few months. Retinal arteries show very decided variations in calibre: constrictions and dilatations.

Case 7.—J. O'B., aged seventy-five; general arterio-sclerosis. Ophthalmoscopic examination: Papillæ normal but vessels exceedingly narrow, and arteries have recognizable but not very great variations in calibre.

Case 8.—P. K., aged seventy; arterio-sclerosis. Ophthalmoscopic examination: A few colloid spots scattered throughout the retina. Arteries for the most part narrow, with irregularities in calibre.

Case 9.—A. B., aged sixty-nine; arterio-sclerosis. There was at one time an iritis in the right eye leaving synechiæ, for which an iridectomy was made. The papilla is normal; there are patches of choroiditis (not pigmented). Left eye (atropine dilatation): some of the smaller arteries only show constrictions in their calibre. There is great irregularity in the retinal pigment. Colloid excrescences are seen on the papilla.

CASE 10.—T. L., aged seventy-three ; arterio-sclerosis ; aortic insufficiency. Vision fair. Ophthalmoscopic examination : Papillary borders dim ; veins normal ; arteries somewhat narrow ; a branch of the left superior nasal artery has a decided dilatation. (No note concerning arterial pulsation.)

CASE 11.—Mr. K., aged fifty (?) ; arterio-sclerosis. Suspicion of Bright's, but urine normal. Retinal arteries rather full and tortuous, and show slight constrictions of calibre. Scattered about the retina there are a number of very fine pale spots, some scarcely discernible, others as large as an artery of first order.

CASE 12.—J. S., colored, aged seventy or more ; arterio-sclerosis.—Iritic synechiæ in the left eye prevent ophthalmoscopic examination. In the right eye there are slight variations in the calibre of the retinal arteries.

CASE 13.—J. McM., aged thirty-eight ; marked regurgitations ; pulmonary phthisis ; slight arterio sclerosis. (Temporal vessels very tortuous.) The retinal vessels have slight changes in calibre, some quite marked.

CASE 14.—C. R., aged sixty-nine ; marked arterio-sclerosis. (Radial arteries like pipe-stems.) The upright image of the right retina shows slight variations in calibre.

CASE 15.—L. G., aged fifty-two ; arterio-sclerosis. Urine normal. (Died within three years after examination ; I was informed that death was due to apoplexy.) The retinal vessels presented marked variations in calibre. V $\frac{6}{6}$.

CASE 16.—Mrs. B., aged sixty-three ; general arterio-sclerosis. Dimness of vision for several years. Right eye : Synchysis scintillans in great quantity ; marked variations in calibre of arteries in his eye. Left eye : Fine vitreous opacities. Slight central senile-retinal atrophy. Central scotoma in both fields of vision.

CASE 17.—Mrs. I., aged seventy-nine ; moderate arterio-sclerosis and incipient phthisis. In the left eye the arteries are full and tortuous and show numerous constrictions in their course. Scattered throughout the posterior portion of the eyeball are numerous small grayish opacities.

CASE 18.—Mr. C., aged fifty ; slight arterio-sclerosis. Marked tobacco and alcoholic amblyopia ; the papillæ are hyperæmic, the temporal halves exceedingly blurred ; the retinal arteries are very tortuous and show variations in calibre. In the left papilla there are minute vascular dilatations (aneurisms ?). In the right eye a large mass of opaque nerve fibres somewhat obscures the picture.

CASE 19.—L. T., aged sixty, female; apoplectic attack one year before; marked degree of arterio-sclerosis in the radial and temporal vessels. The retinal arteries are quite full and present constrictions and dilatations.

CASE 20.—M. M., female, aged thirty-eight; incipient alcoholic arterio-sclerosis. Pallor of macular portion of papilla; the retinal arteries are somewhat narrow and show constrictions.

CASE 21.—S. C., female, aged forty-five; moderate arterio-sclerosis; had an apoplectic attack one year before, resulting in hemiplegia, involving the face. The retinal arteries were of normal fulness, but show manifest though not marked constriction.

CASE 22.—M. W., female, aged forty-five; hemiplegia; slight arterio-sclerosis. The retinal arteries are moderately full and show constrictions.

CASE 23.—Mrs. K., aged sixty-three; marked arterio-selerosis; numerous colloid excrescences in both papillæ; the retinal arteries are in part quite tortuous, and have decided narrowings and dilatations. (V, either eye, $\frac{8}{12}$.)

CASE 24.—Mrs. B., aged forty-eight, complained of slight visual trouble. She was otherwise well. Cardiac sounds normal; urine contained neither sugar nor albumen; slight arterio-sclerosis. In both eyes there were some fine lenticular opacities; the retinal arteries were somewhat tortuous, full, and presented many decided narrowings and dilatations. At the curves of the arteries distinct pulsation[1] could be seen in the form of locomotion; this became still more decided when the patient walked up and down the room a few minutes; the vision of either eye with the correction was $\frac{8}{12}$.

It will be seen in reviewing the above cases that the degree of the variations in calibre (dilatations and constrictions) of the retinal arteries does not bear a definite relation to the general signs of arterio-sclerosis in the other parts of the body. Thus in Case 14, of exceedingly marked arterio-sclerosis in which the radial arteries were thoroughly calcified, the signs of arterio-sclerosis in the retinal vessels were slight.

[1] For description and explanation of retinal arterial pulsation in arterio-sclerosis see Raehlmann, *Zeitschr. für klin. Med.*, vol. xxi., and Thoma, *Graefe's Archiv*, vol. xxxv., 2, p. 1.

In Cases 13, 17, and 18, on the other hand, the general evidences of arterio-sclerosis were slight, while the constrictions of the retinal arteries were very marked. In many cases of marked arterio-sclerosis of long standing we find the retinal vessels narrow, as in Cases 7 and 8; it is probable that general narrowing of the vessels throughout their entire course is the ultimate stage of retinal arterio-sclerosis.

It is interesting to note the occurrence of choroidal and retinal changes associated with the vascular alterations described above. That the latter should by preference occur in the macular region evidently depends upon the fact pointed out by Dimmer, that the nutrition of this portion of the retina is the poorest.

In several cases, cerebral affections occurred either prior to or after the examination; but few of the cases were followed for any length of time, and we shall therefore only point out the occurrence of cerebral vascular disturbances in Cases 2, 15, 19, 21, and 22. That cerebral and retinal arterio-sclerosis should go hand in hand needs no mention, for this is a fact long known.

The anatomical description of sclerotic retinal arteries has been furnished by a number of investigators; one of the most recent, Lurje[1] of Dorpat, describes the condition of the retinal vessels in sclerosis of the cerebral and other arteries. In the central retinal arteries, the intima showed constant changes; it was often much thickened, this being due to the development of concentric fibres of connective tissue varying in its corpuscular elements, or, in other cases, to a homogeneous membrane varying in thickness and often wanting in corpuscles, formed between the endothelium and the elastic membrane.

The media were often found unchanged; at times it was somewhat narrow, and the number of muscle-corpuscles was diminished; this layer sometimes assumed a homogeneous hyaline appearance, especially in the outer zone. The adventitia was thickened in a number of cases, sometimes as much as two or three times its normal thickness.

[1] "Über d. Verhalten der Netzhautgefässe bei Sclerose der Hirnarterien," etc. Inaug.-Dissertation. Dorpat, 1893.

These changes were relatively greater in the finer arteries than in the larger ones; they varied somewhat in different cases.

Lurje's results agree with those of Mackensie, Oeller, and Raehlmann. Manz, Hirschberg, and Felser, on the other hand, found hyaline changes of the whole wall of the retinal arteries, both fine and large, but more marked in the finer ones.

Lurje shows that the pathological changes, which he observed in the retinal arteries, agree closely with those which Thoma found in the smaller vessels of the kidney in interstitial nephritis. By careful measurement, Thoma determined that the lumen of these vessels was only relatively narrowed (in comparison to the thickness of the vessel). The absolute lumen was greater than normal. He found absolute narrowing of the lumen only in the vessels of the foot and leg, in which case his explanation is that a smaller quantity of blood passes through these vessels. Their narrowing, which, according to Thoma, is always compensatory, is thus accounted for. Lurje assumes a similar explanation for the narrowing of the calibre of the retinal arteries, namely that a smaller current of blood is allowed to pass through the narrowed retinal capilaries, though he thinks it possible that the narrowing may in part be due to a hyaline swelling of the intima.

DIABETES AND ARTERIO-SCLEROSIS.

CASE 25.—Mr. P., aged seventy; slight diabetes; arterio-sclerosis. There are a great number of colloid excrescences in the retina; there is senile atrophy in the macula and an incipient cataract. The variations in calibre in the retinal arteries are of the most marked character.

I have placed this case under a special head. At the same time I am of the opinion that the retinal changes bear no relation to the diabetes. For the latter disease was, in this case, of the benign form found in the aged and stout; and besides this, no similar vascular changes have been seen in cases of diabetic retinitis as is pointed out by Hirschberg[1] in his description of this disease.

[1] *Deutsche med. Wochenschr.*, 1890, Nos. 51 and 52.

CHRONIC NEPHRITIS.

Five of the patients were suffering with chronic Bright's disease. Their ages ranged from forty to sixty-seven. All suffered with fairly marked arterio-sclerosis.

CASE 26.—J. M., aged fifty-three. Chronic Bright's disease; arterio-sclerosis; left ventricle hypertrophied. By the indirect examination, the ophthalmoscopic picture was apparently normal. Direct ophthalmoscopic examination: Right eye, arteries rather tortuous with marked constrictions of calibre; one minute hemorrhage. Left eye, variations in calibre decided, many arteries exceedingly fine; few, fine, hemorrhagic spots.

CASE 27.—J. B., aged forty. Aortic regurgitation, chronic Bright's disease. Right eye, hemorrhagic spots on the papilla. In both eyes the arteries have marked and very frequent constrictions of calibre.

CASE 28.—G. J., colored, aged forty-nine; hemiplegic, marked arterior-sclerosis. Urine contains some albumen. Retinal arteries very irregular in their calibre, at times becoming so constricted as to almost disappear. One small infiltration in the retina as seen in albuminuric retinitis.

CASE 29.—T. J., aged fourty-four; chronic Bright's disease. Arteries have a few decided constrictions. (Fine connective-tissue formations in vitreous in front of retina, reminding one of retinitis proliferans; may be congenital.)

CASE 30.—Mr. G., aged sixty-seven, complained July 13, 1895, of blurred vision of the right eye, with which he could but count fingers at about two feet. Vision of the left eye $\frac{9}{18}$. In both eyes there are numerous retinal hemorrhages and a number of whitish spots characteristic of albuminuric retinitis. In both eyes the retinal arteries presented most marked constrictions and dilatations in their calibre and in the left eye a branch of superior nasal artery was converted into a white line, the blood column being entirely hidden from view. The great impairment of vision in the right eye was due to hemorrhage in the macula. The patient presented many symptoms of Bright's disease and the urinary examination by Dr. Julius Friedenwald confirmed the diagnosis of chronic interstitial nephritis. The condition of the eyes remained the same and the patient was able to fill a very responsible position until November, 13, 1895, when he died suddenly.

It is proper at this point to mention that *numerous cases* of *Bright's disease* were examined in which *no variations of calibre* in the retinal arteries could be discovered.

The condition of the ocular vessels in retinitis albuminurica was the subject of careful study by Dr. Carl, Duke of Bavaria.[1]

He found extensive changes affecting the vessels of all parts of the eyeball. There was but slight alteration of the endothelium; the other layers were all more or less homogenized, usually thickened, and contained vacuoles and masses which stained badly with carmine,—the evidences of retrogressive metamorphosis. The capillaries did not show distinct structural changes but were converted into homogeneous, slightly thickened tubes with narrowed lumen. These changes in the vessels make their walls so fragile that ruptures and hemorrhages occur. (See Cases 26, 27, and 30.)

HEMORRHAGES OF THE RETINA.

In some of the cases of arterio-sclerosis described above there were retinal and choroidal changes which were probably dependent upon the pathological condition of the vessels. Retinal hemorrhages have long been known to result from arterio-sclerotic changes without any other affection, such as Bright's disease, diabetes, or alterations in the condition of the blood. It is rare, however, to find any mention, in cases of retinal hemorrhages, of vascular alterations visible with the ophthalmoscope. Such a case is the following:

Case 31.—J. L., male, aged sixty-four, applied for treatment on account of the sudden appearance a few days before of dimness of vision of the right eye. The left retina and papilla were normal; in the right eye the veins were tortuous and congested; one hemorrhagic spot covered the entire half of the papillary border and another large hemorrhagic effusion spread along the superior nasal vein; a small hemorrhage near the papilla con-

[1] "Ein Beitrag zur path. Anatomie des Auges bei Nierenleiden," von Dr. Carl, Herzog in Bayern. Wiesbaden, 1887.

tained a grayish spot; the centre of the retina appeared clear, but below there were fine punctate hemorrhages. The retinal arteries were somewhat narrow, the fine ones very tortuous; no variations in calibre were to be found (undilated pupil). The field of vision was normal, vision right eye $\frac{6}{60}$, vision of left eye $\frac{6}{15}$ without glasses. At this time he was carefully examined by Dr. J. Friedenwald, who found the radial pulse very hard, the temporal arteries prominent, kidney and heart normal.

March 26, 1895, he returned; vision of the left eye $\frac{8}{24}$, 1.5 $\frac{8}{18}$; vision of the right eye: could count fingers at three metres. Right eye had been gradually getting worse.

Under cocaine dilatation of the small pupil the following observations were made: Three hemorrhagic spots were seen lying on the papilla, two in the macular half; the retinal veins were slightly tortuous, rather narrow; the arteries were exceedingly attenuated, but they could be followed far into the periphery, many becoming somewhat wider after they left the papilla; thus *the inferior temporal artery disappeared entirely near the papilla for a short distance* (about 1 P. D.). In the vicinity of the papilla there is one fine spot, but in the periphery and in the macular region there were numerous small punctate hemorrhages. There was also a slight vitreous opacity and beginning cataract. The left eye was apparently normal; a few arteries showed slight general narrowing, but no marked constrictions. There was an accumulation of pigment in the fovea.

At this time the radials were apparently normal and the temporal vessels were no longer prominent. Urine normal, heart sounds normal. In the field of vision there is a typical wedge-shaped defect due to obstruction in the inferior temporal artery.

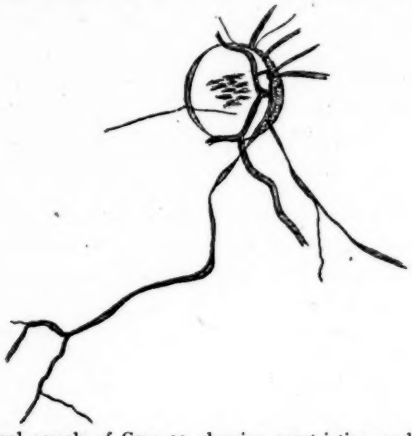
GLAUCOMA.

In view of the long-assumed and more recently demonstrated relation between glaucoma and general and local arterio-sclerosis, the following cases are interesting. We have here two cases of glaucoma, one subacute, the other simple, showing no tendency to hemorrhages, both of which presented the pathological appearance of the retinal arteries which are being described, to a most marked degree.

CASE 32.—Mrs. I., aged fifty-eight, was examined April 3, 1895. In the left eye there was a typical glaucomatous excavation, and

in the field of vision there was a large defect on the temporal side, and a still larger one on the nasal, reaching almost to the point of fixation ; central vision was still fair, with cylindrical correction $\frac{8}{18}$. The tension of the left eye was slightly increased.

In the right eye the conditions were different but equally interesting ; there was a decided excavation of the papilla, but it did not extend beyond the limits of what we call " physiological " ; there were no other signs of glaucoma ; field of vision normal ; central vision perfect. Still the eye was not a healthy one as the condition of the retinal vessels showed. All of the arteries had numerous and marked constrictions and dilatations. The inferior temporal artery began as a very fine line on the papilla ; soon after leaving the papilla it dilated to three times its previous calibre



Sketch of retinal vessels of Case 33, showing constrictions and dilatations of retinal arteries.

or more. There were many colloid deposits scattered throughout the retina. The retinal vessels of the left eye are narrow in comparison of those of the right and the constrictions are somewhat less marked.

Case 33.—Mrs. F., aged sixty-four, came under my observation in June, 1895. The left eye had been blind for some time,—glaucoma absolutum ; the pupil was dilated, the anterior chamber shallow, the sclerotic vessels exceedingly wide and tortuous, the papilla had a deep and wide excavation, and there was central haziness of the lens. The right eye had also been failing for

some time ; an iridectomy had been made almost one year previously, but it was small, and both edges of the iris were dragged into the scar. Since the operation slight attacks of subacute glaucoma had occurred quite often, and had been relieved by eserine which had been ordered by her physician. The pupil was dilated when first seen, but contracted rapidly after an instillation of eserine. The anterior chamber was shallow, the media clear ; there was a large but shallow excavation of the papilla reaching to the margin, excepting on the nasal side. The tension was slightly increased, vision $\frac{1}{20}$, but she could count fingers at about twenty feet. The field of vision was constricted on all sides, but especially in the upper and nasal part, and still more in the lower nasal where the apex of the defect almost reached the point of fixation. A partial drawing of the retinal vessels was made at this time (see Figure). An iridectomy was made, June 17, 1895, with very good results. Vision improved slightly, and the field became somewhat larger than before the operation.

These marked signs of vascular disease are very significant. We know from the researches of Birnbacher and Czermak that one of the most important pathological factors in the production of glaucoma is disease of the venous outlets of the eye. The occurrence of other vascular affections, visible with the ophthalmoscope, is therefore of importance.

Another reason for calling special attention to them is their evident bearing upon retinal hemorrhages in glaucoma, though as stated above these were absent in both cases. In Case 33 no retinal hemorrhages were found even after an iridectomy, though they were much feared. It is a matter deserving close inquiry to determine whether the appearance of the vascular changes under consideration in the retina predispose to retinal hemorrhages after an iridectomy, and whether they bear any relation to hemorrhagic glaucoma. In one case of simple glaucoma with retinal hemorrhages which has recently come under my observation, no such vascular changes could be discovered.

Garnier[1] in an article published in 1892 shows that endovasculitis may result secondarily from glaucomatous intraocular pressure. He and Thoma conclude that in this case " it

[1] *Centralblatt f. Augenheilkunde*, 1892, p. 9.

is a compensatory endarteritis due to slowing of the blood current, while non-traumatic glaucoma is probably the result of the general vascular disease often called arterio-sclerosis, but better angio-sclerosis. This rise of intraocular pressure on the other hand again leads to a secondary arterio-sclerosis."

In Case 33 we are therefore unable to state to what extent the arterio-sclerotic changes in the retina were primary. In Case 32, in the left eye the vascular alterations were pronounced, even though that eye had as yet no definite signs of glaucoma and though the intraocular pressure had not been increased.

Ole Bull [1] has described changes of the blood-vessels which produced sudden diminution of vision from disturbance of the circulation; these cases were hitherto ascribed to embolism. His drawings show threadlike contractions of the vessels, somewhat similar to those described in this paper, but much more marked and more abrupt. One of his cases is simple glaucoma with deep excavation. He considers these constrictions to be due to spasms of the arteries. In this, few, I think, will agree with him. They were probably similar to those in Cases 32 and 33, and due to thickening of the vessel-wall.

ATROPHY OF THE OPTIC NERVE.

In concluding this paper reference may be made to a few cases of atrophy in which the retinal arteries showed the characteristic variations in calibre. In these cases the vascular changes may have been primary or secondary. I have seen these appearances in simple optic atrophy as well as in atrophy from embolism, but never in the vascular atrophy associated with pigmentary degeneration of the retina.

The conclusions which may be drawn from the cases described in this paper are that the vascular alterations manifesting themselves as constrictions and dilatations of the calibre of the retinal arteries are not of infrequent occurrence, and that they are important as indications of local as well as of general vascular disease.

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[1] *Trans. of the Ninth Internat. Med. Congress*, vol. iii., p. 663.

THE AFFECTIONS OF THE CORNEA IN PLASTIC IRITIS.

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(With seven figures in the text.)

THE cornea is affected in every case of iritis. In no case does it retain its perfect transparency. The opacities consist of deposits upon Descemet's membrane and infiltrations in the *substantia propria.* The former are constant; the latter, occasional. The deposits on the posterior surface of the cornea may be conveniently divided into the fine and coarse; each of these will be treated under its own heading.[1]

I.

FINE DEPOSITS UPON THE MEMBRANE OF DESCEMET.

These can be seen in all cases of iritis; they are usually overlooked because the methods of examination required are not generally practised. The most satisfactory method of examination is by means of an ophthalmoscope with a strong convex lens placed behind the central opening. This method was described by Hirschberg,[2] for the examinations of opacities in the anterior portion of the eyeball. The lens used was 20 D convex, which enables the observer to bring his eye close to the one examined, and thus obtain a magnified image. In my own examinations the lenses used were usually stronger than that mentioned above; I have sometimes used one of 40 D, but have found the

[1] No attempt will be made in this paper to distinguish iritis and irido-cyclitis.

[2] Hirschberg, article on "Ophthalmosc." in Eulenburg's *Real-Encycloped.*

stronger combinations of Morton's ophthalmoscope, namely 25 to 32 D, most satisfactory. In making these examinations it is best to use a plane mirror and subdued illumination. The deposits appear as fine points, scattered profusely throughout the pupillary area. They are very fine, so fine that even thus magnified they can just be recognized as individual points. They form a layer as of the finest dust, and stand out most prominently when the patient's eye is so directed that the background is the bright light reflected from the papilla.

These dust-like deposits may be scattered over the entire cornea, but they are usually most abundant in the lower half (see Fig. 1). Here and there they form larger heaps,

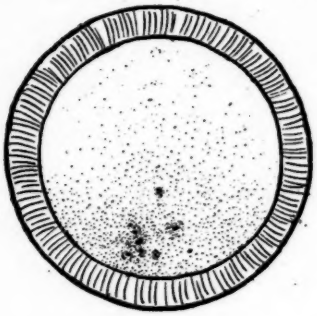

FIG. 1.

and among these we may see the larger deposits, which will be described under the second heading. I have examined many cases of iritis as assistant at Hirschberg's Clinic, and since then in private practice, and I have never met with any in which a careful examination did not reveal the affection just described.

The examination of these deposits, by means of lateral illumination and a good magnifying glass, enables us to form a definite view of their location. Thus examined they are seen to be minute deposits on the posterior surface of the cornea. In certain positions, they have much the same appearance as moisture deposited on one surface of a plate

of glass and viewed from the other side. When the larger deposits are present, they enable the observer to still further assure himself that the fine spots are likewise deposits upon the membrane of Descemet.

The few clinical histories which follow will serve as examples.

CASE 1.—Wm. H., aged twenty-four, was admitted into the City Hospital April 24, 1893, with acute articular rheumatism of the left knee, which had made its appearance about one week before. He was given the salicylate treatment, and was discharged May 19th, cured A few days afterwards (May 25th), he returned with beginning iritis in both eyes. In the right eye there was slight ciliary congestion, but the pupil was normal in shape, and the color of the iris was unchanged. However, there were fine

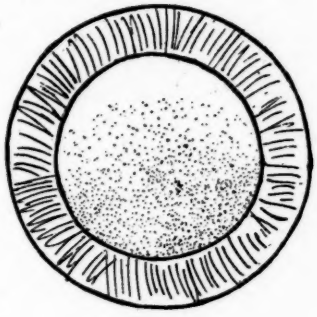

FIG. 2.

deposits on the membrane of Descemet (Fig. 2); no deposits could be found on the anterior capsule.

The condition of the left eye was more severe than in the right; the ciliary congestion was marked, the iris was slightly discolored; there were a great number of dust-like deposits on Descemet's membrane, but there were no synechiæ, though the iris was sluggish, and dilated only moderately after instilling atropia. He was treated with salicylate of soda and atropia was instilled. June 1st, the opacity on Descemet's membrane in the left eye was more distinct than at first, forming a typical triangle. The pupil was large, but no fine opacity could be discovered on the anterior capsule. The condition of the right eye was about the same as when first seen. From this time on the condition improved.

CASE 2.—J. H. (colored), aged fifteen, complained, Sept. 1, 1891, of blurred vision. The eyes were but slightly congested; there was no pain; in the right eye there were two fine synechiæ; in both eyes there were brownish deposits on the anterior capsule, finer in the left, coarser in the right. The vitreous of both eyes was clear; there was slight retinal hyperæmia. The blurred vision (R. E. $\frac{8}{18}$, L. E. $\frac{8}{12}$) depended upon the haziness of the cornea; closely examined by lateral illumination and by transmitted light, this resolved itself into a very fine deposit upon Descemet's membrane. Under atropia and iodide of potash he rapidly improved, and was discharged from treatment Oct. 6th; vision of each eye was $\frac{8}{8}$, though the corneal deposits had not entirely disappeared.

CASE 3.—Mrs. L., aged fifty-three, had a mild attack of rheumatic iritis in the left eye. Treatment began March 8, 1892, and the patient recovered in two or three weeks. May 20th there was slight recurrence of the inflammation, and atropia was again instilled. May 25th, I was able to find fine punctate deposits on the anterior capsule, and much more profuse but very fine deposits on Descemet's membrane; the former were found with great difficulty.

As an example of the early stages of iritis the following case is characteristic.

CASE 4.—Mr. E., aged twenty-eight, who had suffered recently with rheumatism, but who denied syphilitic infection, complained December 15, 1891, of pain in the left eye since the previous day. An examination showed circumcorneal injection; slight hyperæmia of the iris; swelling of the iris tissue; a few minute synechiæ; one larger brown spot on the anterior capsule; finest form of deposits on Descemet's membrane in the lower part of the cornea. A careful examination did not reveal any of the fine deposits on the anterior capsule described by Burchardt.[1] The case proved to be a mild form of iritis, and recovery took place in about two weeks.

CASE 5.—Mr. G., aged twenty-eight, applied for treatment January 8, 1891; he had had great pain in the left eye for one week. The examination showed that the pupil was responsive to

[1] Burchardt: "Ein neues Erkennungszeichen der Regenbogenhautentzuendung." *Charité-Annalen*, 1890.

light; there were no synechiæ. The color of the iris was somewhat darker than that of the other eye; a few blood-vessels could be seen on its surface. The circumcorneal congestion was marked, but the ciliary sensitiveness was not great. The cornea was studded with the finest deposits on Descemet's membrane. Atropia was instilled, and on the following day a second careful examination showed the same corneal deposits and likewise striæ [1] in the cornea, but no fine deposits upon the anterior capsule such as are described by Burchardt. The striæ persisted for a number of days during the intense stage of the inflammation; toward the end of January the cornea become clearer, the congestion of the eyeball diminished. February 4th, the eyeball was almost white, but the corneal deposits, though very fine, were still to be found and there were likewise some fine deposits on the anterior capsule of the lens. The condition then rapidly improved.

Case 6.—J. H., aged fifty, was sent by his physician, February 6, 1892, for diagnosis. He had had iritis in left eye for two weeks; there was a distinct history of syphilis of about fifteen years' standing, and he had an eye affection a number of years before. The iris was congested. There was a gray semitranslucent mass of exudation attached by its base to the anterior capsule and projecting out far into the anterior chamber in the form of mushroom. The cornea was studded with small deposits. Further history of the case is not known.

The fine deposits on Descemet's membrane which form the subject of this chapter, make their appearance at a very early stage of iritis and are frequently found before any synechiæ are formed. They persist throughout the duration of the disease and for some time afterwards, but they finally disappear entirely. It is these deposits which cause the pupil and the iris to appear blurred and hazy, and it is these deposits likewise which are often described under *muddiness of the aqueous humor. The most careful examination with the ophthalmoscope or by lateral illumination has never enabled me to discover any floating opacities in the anterior chamber*, similar in appearance to the fine deposits described above.

[1] See below.

Prof. Burchardt has described dust-like deposits on the anterior capsule of the lens in cases of iritis (see above), and regards them as of constant and early occurrence. While cases are met with in which Burchardt's deposits can be seen (as in Cases 2 and 3), I am convinced from numerous examinations that the observations of even as careful and conscientious an observer as Burchardt depend upon an error. The deposits described are in most cases undoubtedly corneal. The error of locating them on the capsule of the lens is easily made, for the distance between the pupil and the cornea is very short. But that the deposits are corneal and not pupillary can be proved: first, by lateral illumination and the use of a good loupe; secondly, by allowing the observed eye, when examined with the ophthalmoscope, to make movements in various directions, thus changing the field of the cornea illuminated, and with it the fine opacities; and thirdly, by accurately focusing the little spots and thus determining that they are situated in a plane anterior to the iris; when they are best seen it requires a movement of the head forward to get a sharp image of the pupillary margin.

Mention may be made here of the fine corneal deposits occurring in choroiditis, retinitis, etc. These are of the same appearance and nature as those just described. They are always associated with abundant dust-like opacities of the vitreous.

Fine infiltration in the substance of the cornea, œdema of the corneal epithelium, etc., give rise to pictures greatly resembling that of the finest forms of deposits on the membrane of Descemet, when they are viewed by transmitted light. But focal illumination readily enables us to differentiate these from the corneal deposits.

Fine particles lying on the anterior surface of the cornea, in cases of conjunctivitis, likewise give the fine punctate appearance when seen by transmitted light. But their movements following the raising of the lids established their nature.

We shall close this chapter by referring to the clinical significance of the presence of fine deposits on Descemet's

membrane. This sign alone, though insufficient for the diagnosis of iritis, will rouse our suspicion and direct our investigation into the interior of the eyeball, where some lesion will be found on account of it. *The presence of these deposits associated with a sluggish pupil and hyperæmia of the iris, suffices to establish the diagnosis of incipient iritis,* and as the treatment of iritis can not be begun too soon, it will help us to institute early and proper treatment.[1]

II.

LARGE DEPOSITS ON THE MEMBRANE OF DESCEMET.

These deposits have so frequently been described and are so well known under the names of "*Descemetitis,*" "*Keratitis punctata,*" "*Aqua-capsulitis,*" "*Iritis serosa,*" etc., that it would be useless to enter here into a lengthy description of this form. It is proper however to call attention to the fact that these deposits are likewise found in the ordinary forms of *plastic iritis,* scattered among the finer deposits of Class I. They make their appearance somewhat later than the latter, and usually require longer time for their total disappearance. We frequently observe the persistence of the larger deposits for some time after the disappearance of the finer ones. The investigations of Knies, Fuchs, and others have shown that while the endothelium of Descemet's membrane remains perfectly normal under the smaller deposits, it is changed or lost under the large ones. This may open the way for the entrance of aqueous humor into the corneal tissue and to permanent corneal opacities.[2]

As an example of this form, the three following cases have been selected. They are cases of serous, syphilitic (plastic), and sympathetic iritis, respectively.

CASE 7.—Miss R., aged twenty-nine, applied with eye trouble of about ten days' duration. The cornea was hazy, the pupil

[1] Synechiæ are often absent during the first few days of the inflammation. See Arlt: *Klin. Darstellung der Krankh. d. Auges,* Vienna, 1881, p. 226.

[2] Knies: Knapp and Schweigger's ARCHIVES, ix., p. 125. Fuchs: *Graefe's Archiv,* vol. xxx., 3, p. 141.

dilated under atropia, there were no synechiæ ; numbers of large and fine deposits upon the membrane of Descemet formed the typical triangular figure (see Fig. 3).

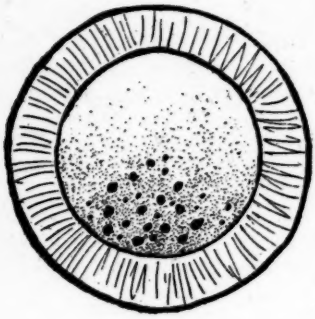

FIG. 3.

CASE 8.—Mr. P., aged twenty-three, had double specific iritis, which began about the middle of June, 1894. He had been under atropia treatment for several weeks, when first seen, July 28, 1894. There were no synechiæ in the left eye ; in the right eye there was a broad synechiæ below ; in both eyes there were numerous fine and coarse deposits on the membrane of Descemet, similar to those of Fig. 3. The initial lesion had occurred about one year previously. The patient was put under atropia and mercurial inunction treatment, but lost from observation before recovery had taken place.

CASE 9.—A. K., aged twenty-seven, was injured in his left eye when two years of age. The eye never gave him any trouble until October, 1893, when it became slightly inflamed owing to a "cold." He came for treatment, May 10, 1894, complaining of great pain over the left eye and in the left temple during the last three days. The eye itself was not painful, but very sensitive to pressure, especially the upper-outer portion of the ciliary body. He also complained that the vision of the right eye had become slightly obscured, and that the eye was very sensitive to light. The examination showed cicatricial bands between the lower lid and the left eyeball, and a pterygium-like growth on the inner side of the eyeball. The lower portion of the cornea was converted into a very vascular leucoma ; the upper portion was

clearer, showing a very irregularly dilated iris; there was a reddish reflex in the posterior surface of the cornea, probably due to vascularity. V = o; tension increased (very sensitive).

There was no congestion of the conjunctiva of the right eye; the blue iris was not discolored; there were numerous synechiæ visible without a mydriatic; the cornea was studded with small spots (deposits), seen without a magnifying glass. The ophthalmoscope showed a somewhat blurred papilla, the retinal veins slightly tortuous and somewhat enlarged. Vision, $\frac{6}{18}$; field of vision normal; tension normal. Enucleation was insisted upon, but refused by the patient, who disappeared from observation. This is the almost characteristic form of sympathetic inflammation—an almost painless uveitis, with abundant synechiæ and large deposits on Descemet's membrane.

III.

OPACITIES OF THE SUBSTANTIA PROPRIA.

This class includes all the varied forms of parenchymatous inflammation observed during the course of iritis.

A. The most common of these are minute infiltrations of the corneal tissue in the form of fine lines, known as *keratitis striata.* These are present only during the period of greatest activity of the iritic inflammation, and they disappear as the inflammation subsides. They are partly responsible for the blurring of the iris and of the pupil. They may be present in the form of fine lines, as in the following case, or in the more pronounced character of larger and broader lines, which may anastomose with each other (see below).

Case 10.—Mrs. P., aged forty, had a severe attack of iritis, beginning Nov. 13, 1894. There were no signs of syphilis, but a distinct history of rheumatism was given; she was treated at the City Hospital, where she entered Nov. 27, 1894, with salicylate of soda and atropia, and made a complete and rapid recovery. Soon after leaving the hospital the inflammation recurred (about Dec. 15, 1894). The iris dilated under atropia, and a broad pigmented ring of brownish deposits was seen upon the anterior capsule. There were likewise profuse deposits upon the surface of the cornea. In less than two weeks the inflammation had sub-

sided and the eye was white again. About Jan. 15, 1895, the third recurrence took place in the same eye, and the patient returned for treatment on Jan. 23, 1895. At this time a specific macular eruption was noticed, which, according to the patient, had made its appearance three weeks previously; it was spread over the body and limbs. This was therefore one of those rare cases in which the iritis precedes the other signs of the secondary stage of syphilis.[1] Feb. 1st, the inflammation had again subsided slightly, and the condition was as follows: Deposits, fine and coarse, profusely spread over the lower part of the cornea; synechiæ and deposits on the anterior capsule, partly coarse and partly fine; fine lines in the corneal tissue. These lines are be-

FIG. 4.

tween 2 and 3 *mm* in length, are straight, and are placed in all positions, forming angles with each other (see Fig. 4). They are especially distinct in the lower half of the cornea; by lateral illumination they can be seen even by the naked eye; they are not visible by transmitted light.[2]

The inflammation improved, and on Feb. 6th, the streaks had disappeared, but there were still many deposits upon the posterior surface of the cornea.

An aggravated form of probably the same condition the appearance of longer and broader infiltrations in the form of straight lines, sometimes parallel, sometimes at angles, and at times anastomosing with each other. These are usually met with only in those cases in which the inflam-

[1] See Alexander: *Syphilis und Auge.* Wiesbaden, 1889, p. 55. In our case the appearance of the iritis preceded the other secondary signs by at least six weeks.

[2] See also Case 5.

mation is very intense and associated with severe inflammation of the ciliary body. They are best seen by lateral illumination, but are also easily recognized by transmitted light, especially if the mirror is slightly but rapidly tilted. The sketches in my record books are not so characteristic as is one published by Hirschberg in Eulenburg's *Encyclopedia*, which I therefore insert here (see Fig. 5). These

FIG. 5.—From Hirschberg.

lines are probably the corneal tubes of Bowman, over-filled with serous fluid. They are probably identical with the linear opacities occurring after the extraction of cataract, and known as *keratitis striata*.

B. The next form is the occurrence of minute gray infiltrations near the periphery of the cornea. Some become thoroughly vascularized, others are non-vascular and disappear completely during a few weeks after subsidence of the inflammation. It is claimed by some observers that this form of parenchymatous inflammation depends upon defects and other pathological changes in the endothelium of the membrane of Descemet, and that it occurs only after the inflammation has persisted for a long time. This would appear to hold good in many cases, but in some we find these corneal infiltrations occurring very early in the course of iritis. Besides, they are sometimes found at regions of the cornea in which there have been but the slightest and finest deposits, as in the uppermost part. It is therefore

much more probable that these corneal infiltrations often depend upon inflammatory lesions in the cornea similar in their nature to those of the iris and independent of any change in the membrane of Descemet.

CASE 11.—Mr. S., aged twenty-two, suffered with acute iritis soon after an attack of measles. The inflammation began April 10, 1895, with fine deposits on the cornea, discoloration of the iris, etc. April 14th, the pupil was moderately wide, there were deposits on the anterior capsule and upon the posterior surface of the cornea, and several synechiæ. The inflammation continued with considerable severity until April 18th, when leeches were applied and great improvement followed. April 26th, the pupil was wide and round, but there were two corneal infiltrations; the larger near the upper margin of the cornea and a faint haze, consisting of small gray spots situated deep in the cornea, near the lower margin. The iritis rapidly subsided. Examined Oct. 5, 1895, the cornea was found perfectly clear. In this case no vascularization had taken place.

In some cases the corneal infiltrations begin like those just described, but gradually become larger and sometimes assume the typical picture of *circumscribed sclerotizing keratitis*. These infiltrations always begin in the periphery in the form of a triangle, with the apex pointing toward the pupil, and they increase by gradual growth toward the centre of the cornea. At the same time there is a development of blood-vessels in the deeper layers of the cornea, like those of diffuse keratitis. After the blood-vessels have formed there is a slow disappearance of the infiltration, and this may go on until the corneal tissue becomes apparently normal; in most cases fine opacities can be discovered by accurate examination a long time after the apparent disappearance of the opacity; and in some, the cornea remains permanently sclerotized.

We may assume that these opacities are likewise often independent of any change of the underlying endothelium of Descemet's membrane.

CASE 12.—Mrs. C., aged forty-five, had had double specific iritis for some time before I first saw her, on June 13, 1895;

the right eye had been cured, but in the left there was almost complete synechia; the pupil was somewhat dilated, but very irregular, and there were many brownish deposits upon the capsule; the eyeball was greatly congested.

The most interesting changes were in the cornea; they consisted of numerous fine and coarse deposits upon the posterior surface, a number of small gray infiltrations situated deep in the cornea, and many fine blood-vessels passing into the substantia propria in all parts of the corneal periphery. In two weeks the condition had improved slightly; in two months more the cornea was almost perfectly clear.

Case 13.—Mr. C. S. came for treatment April 23, 1890; the left, and slightly squinting, eye had been inflamed for about two weeks, but painful only for one day. There was no history of syphilis, but he had suffered with rheumatism. There was great engorgement of the vessels of the iris of the left eye, and fine dots were scattered in great profusion over the posterior surface of the cornea. A few fine synechiæ could be found, though the iris was still movable and the pupil round. The corneal opacity prevented a distinct view of the retina. V, L E, $\frac{8}{60}$; — 2 Ds $\frac{8}{24}$. The diagnosis was subacute plastic iritis. Atropia and mercurial inunctions were ordered. The pupil was dilated, though not maximum, but the cornea remained hazy. When examined closely this haze could always be solved into fine corneal deposits. On the anterior capsules there were numerous fine pigment spots. May 22, 1890, he was greatly improved. The eye was whiter; the pupil was round and dilated. V, L E, $\frac{8}{18}$; — 1 Ds $\frac{8}{12}$. The patient soon returned to work, but the eye did not become perfectly white.

About the 15th of June the eyeball again became inflamed, the anterior chamber became deeper, and the tension was slightly increased. The corneal epithelium was somewhat roughened below and a number of fine synechiæ formed. This condition did not improve immediately under treatment; soon the eye became painful. June 28, 1890, a slight grayish-white infiltration made its appearance in the lower part of the cornea (see Fig. 6). T normal. July 4th, the infiltration had extended, but the eye was less irritated, the pupil larger. The infiltration below gradually increased and fresh ones appeared, notably one in the upper-outer portion of the cornea. The anterior chamber had, in the meantime, become still deeper, so that the inner circle of the iris

receded beyond the outer one, the two being separated by a fold. Aug. 9th, the infiltration in the upper portion of the cornea was much larger than those below ; the eye was still slightly sensitive and reddened. The disappearance of the infiltrations below was preceded by their vascularization, and at this time (Aug. 14th) the upper infiltration had become vascularized. Aug. 23d, the eye was greatly improved ; the hyperæmia of the iris had almost disappeared. The corneal opacities above and below had become smaller and the vascularization has apparently disappeared to the naked eye. The opacities on the membrane of Descemet had likewise partially disappeared. Aug. 27th, the conjunctiva was pale, excepting below, where there was slight purplish tint as after scleritis. Later, one fresh infiltration made its appearance on the nasal side, but it remained small.

FIG. 6.

The eyeball soon returned to its normal condition. Dec. 10, 1895 (five years later), the eye was again examined. There were a few small synechiæ. The cornea was apparently normal, but a fine vascular network could be seen in various parts by lateral illumination and the loupe, and still better by transmitted light. Vision good.

There are other rarer forms of the corneal involvement after or during iritis. As one of these we shall include in this paper a peculiar form of circumscribed keratitis. Its description would correspond most with Mauthner's *keratitis punctata vera*, but differed from it in that the opacities in this affection are small and that it is not associated with iritis.[1]

[1] See Alexander, *loc. cit.*, p. 44.

CASE 14.—M. J., female, colored, aged twenty-nine, applied for treatment Nov. 12, 1894, for iritis of the left eye; the inflammation had begun four weeks previously. On examination the pupil was very irregular, there were a number of firm synechiæ and a small elevated mass at the floor of the anterior chamber. No history of syphilis could be obtained, but there was a characteristic ulceration of the pharynx which established the diagnosis beyond a doubt. The patient was given atropia locally, mercurial inunctions, and iodide of potash. She was seen at very long intervals, and Feb. 18, 1895, she presented the following interesting appearance:

The right pupil was completely bound down by circular adhesions, and was very irregular. According to her statement the left eye had improved after treatment, but about Christmas (seven weeks after the first examination), white spots developed upon the eye. The pupil of this eye was very irregular and bound down by broad synechiæ, but was larger than that of the right eye. In the cornea there were a number of white, sharply circumscribed spots, between 2 and 3 *mm* in diameter

FIG. 7.

and almost round (see Fig. 7). They were situated in the deeper corneal layers; the surface of the overlying cornea was smooth. There was slight ciliary congestion below the cornea, but the pain was trivial. March 18th, the patient was seen again; the white opacities, as described above, were unchanged. One fresh (?) but very small spot had appeared near the margin of the cornea; the eyeball was almost white, and there was no pain.

A CASE OF BILATERAL HOMONYMOUS HEMIANOPSIA.

By G. W. ALLYN, M.D., Pittsburgh, Pa.

(*With 10 figures in the text.*)

In Part I. of the Archives for 1891, Prof. Schweigger, in reporting a case of "bilateral hemiopia," refers to its infrequency and suggests the propriety of reporting even single cases. With this warrant the following case is offered for record.

Mr. J. H. C., aged forty-nine years, came under observation March 13, 1891, for confusion of vision which had come upon him two weeks before.

History.—The family history of our patient offers nothing to note. In 1863 he was sent from the "front" on James River to a hospital in Philadelphia where, in the delirium of fever, he jumped from the second-story window of the hospital and struck upon the sacral bone. A very ugly wound must have resulted, judging from the scar now present, a ragged one about three by four inches in extent. For several years there remained a partial paresis of the left leg, necessitating the use of a cane. For this disability he was discharged from the service. He has for several years been inconvenienced by a partial paralysis of the sphincter of the urethra. He has used tobacco to excess and took an occasional drink. He was at the time of the attack, and is at this time, 1896, in robust health. When attacked he was in the full discharge of his duties as head of a department in one of our steel mills, a position requiring great exactness with long columns of figures.

The First Invasion.—While standing at his desk, his eyes directed to a piece of paper, the sight of both eyes suddenly left

him. Turning to a friend who was standing near him, and whom he could no longer see, he remarked that his eyes had become blind. In a few moments his sight began slowly to return. The improvement was slow and incomplete, and he came under observation not until three weeks after the onset of the trouble, and then came for glasses to work with. He had had no headache, and simply wished better glasses, bringing from an optician + 3 D. Inspection showed pupils unequal, but this condition he had known to have existed for several years. The right pupil measured 4 *mm* and the left 5 *mm*. They contracted to the stimulus of light directed upon each, but responded slowly to light thrown upon its fellow. Central vision was found to be O D + .75 $\frac{20}{LXX}$; O S + .75 $\frac{20}{L}$.

The accommodation was found to be completely paralyzed. The fields of vision of both eyes were taken as well as could be done with the near points, indistinct from the complete paralysis of the accommodation. The left fields were found blind up to the vertical meridians, except the characteristic projection of about 5° of good vision into the dark fields at the centre.

The charts of this first visit are here inserted :

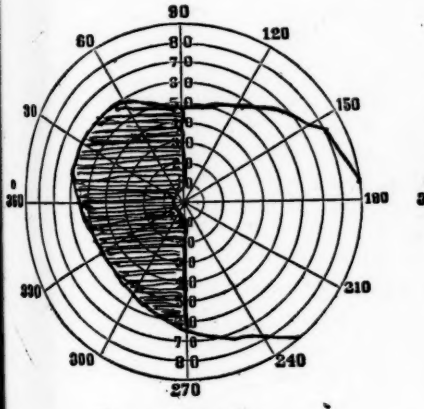

FIG. 1.—RIGHT EYE.

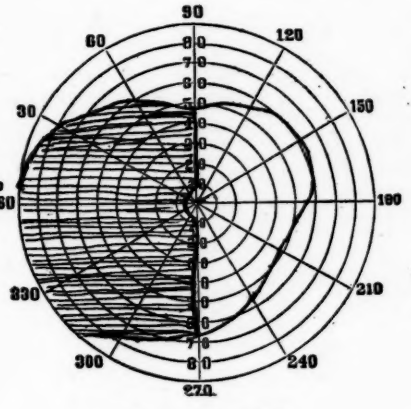

FIG. 2.—LEFT EYE.

The ophthalmoscopic examination was negative. The diagnosis was left homonymous hemianopsia with a lesion in the right tractus between the commissure and the optic lobe—somewhere.

The patient was placed upon alterative treatment and later upon strychnia, and observed from week to week. Further examinations revealed no *new* symptoms. The intelligence, memory, and will remained intact. There was no paralyses of the motions of the eye. The knee-reflex was normal. The gait was firm with closed eyes. As stated, there was no headache and no aphasia. With treatment and time the central vision gradually improved, and on June 5th we find: O D + .75 $\frac{20}{XX}$; O S + .75 $\frac{20}{XX}$. The right visual fields normal in clearness and unlimited. With proper glasses for near work he resumed his former occupation. The firm kindly gave him an assistant to take the heavy part of the work, leaving to him the final inspection of figures. He soon learned to use his eyes to the right with comparative comfort.

The Second Invasion.—On August 19th our patient, without previous warning, fell to the floor and remained unconscious for two hours. Within thirty-six hours the vision of both eyes began to fail quite rapidly, and in a few hours we find him unable to see faces or to find his way about the room. A bright window was to him only an indistinct shimmer. The moderate degree of vision did not return to the eyes promptly as in the first invasion. For a few hours his speech was "thick," but entirely rational. His wife thinks the hearing was somewhat affected.

On August 26th my first examination was made. He was led into the office. His manner on entering was quite similar to that of a patient affected with atrophy of the optic nerve. He walked erect with the head thrown back, with the eyes staring, and he reaching right and left for objects of support. Inspection showed the pupils dilated equally to 8 *mm*, yet contracting under strong light (the ophthalmoscopic mirror) to 3 *mm*. The excursions of the eyes free in every direction. Central vision: O D, counts fingers at seven inches; O S; practically blind to all motions of the hand. An effort at this visit was made to take the fields by the use of tapers, but resulted in little that was not apparent from simple observation; the right field was now blind, and central vision greatly disturbed. As might be expected the ophthalmoscope showed nothing but a healthy eye. Alterative treatment resumed.

August 29th.—Central vision remained unchanged. Since his last visit the patient has discovered that he can see best by turning his head strongly to his right. In this position his vision equals O D $\frac{4}{C}$. This observation remained unexplained at that

time. Since the last visit he has had illusions twice—at one time the nose of his wife was painted red, at the other burglars were breaking into the house.

September 5th.—O D, Central vision $\frac{7}{C}$, oblique vision $\frac{7}{L}$; O S not changed.

From visit to visit central vision showed steady and constant improvement, and he is getting better use of his eyes upon the street.

October 24th.—To-day our patient for the first time came to the office unattended. Central vision: O D + .75 $\frac{20}{XX}$; O S + .75 $\frac{20}{XL}$. Accommodation completely paralyzed, requiring + 4.50 D to read at 12 inches.

October 30th.—Central vision: O D, + .75 $\frac{20}{XX}$; O S, + .75 $\frac{20}{XXX}$. O D with + 4.5 reads type 0.80 D. O S with + 4.5 reads type 2.25 D with difficulty, the print disappearing suddenly. An industrious effort was made to take the fields of vision. Much difficulty was experienced in holding the eyes upon the central point of fixation, which would remain invisible even when a taper was placed at the centre and a + 4 D placed before the eye to be tested

The charts below are the results of this effort:

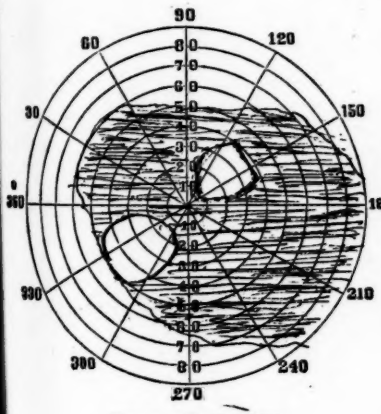

FIG. 3.—RIGHT EYE.

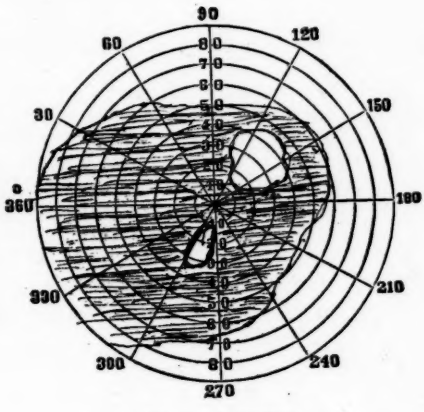

FIG. 4.—LEFT EYE.

This failure of the eye to follow the marker to the centre of the chart, though central vision equalled $\frac{20}{XX}$ and $\frac{20}{XXX}$, appears also at the next effort to take the fields. The discovery now of an area

of recovered vision in the lower portions of the field first invaded explained the oblique vision before mentioned.

November 14th.—O D + 3 reads 0.5 D at 12 inches. O S + 3 reads 1.00 D at 12 inches.

The accommodation has about recovered normal strength. The visual fields are given as taken, but with the same difficulty in holding the eye upon the point of fixation an error is evidently recorded. In the field of the left eye the area of repair should have been in the left lower quadrant, where it will appear in all later tests and where also will disappear the inability to follow the marker to the point of fixation. The fields are inserted :

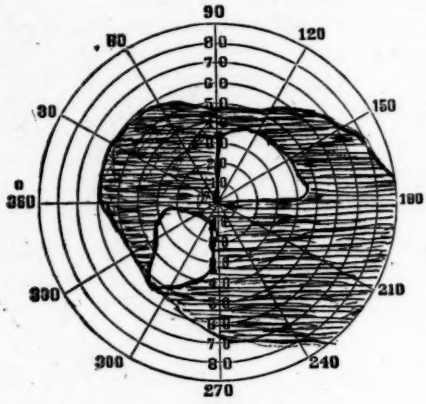

FIG. 5.—RIGHT EYE.

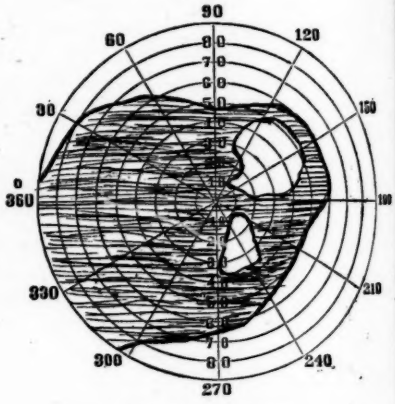

FIG. 6.—LEFT EYE.

December 12th.—Two days before had had a relapse in the central region. O D $\frac{20}{C}$. O S $\frac{20}{CC}$. Can not read with all of the accommodation supplied.

I took the fields of vision and found them improved (see Figs. 7 and 8).

December 26th.—O D + 1 $\frac{20}{LXX}$; O S + 1 $\frac{20}{LXX}$.

January 9, 1892.—O D + .75 $\frac{20}{XX}$; O S + .75 $\frac{20}{XX}$.

January 23d.—Result the same as on January 9th.

February 6th.—The same result as above.

February 9th.—The fields show but little change.

January 13, 1896.—Since the last record in 1892, the patient has enjoyed excellent health and now weighs 190 pounds. Cen-

tral vision equals O D + .75 $\frac{20}{XX}$; O S + .75 $\frac{20}{XX}$; missing one letter of the card with the right eye, and two with the left. Reads

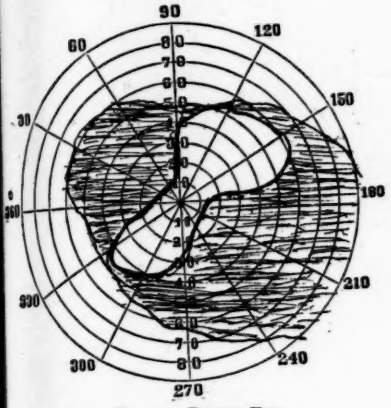

FIG. 7.—RIGHT EYE.

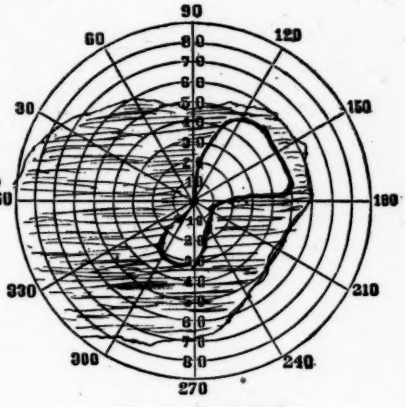

FIG. 8.—LEFT EYE.

with O D + 3 type 0.5 at 15 inches; O S + 3 type 0.5 at 15 inches. The charts of the fields are below:

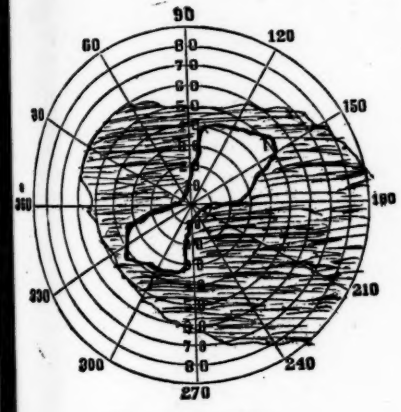

FIG. 9.—RIGHT EYE.

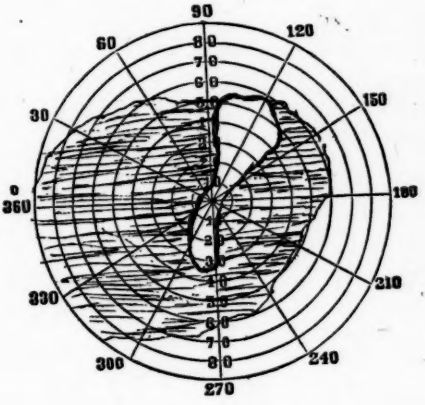

FIG. 10.—LEFT EYE.

The literature of the subject is not extensive and includes but one autopsy by Schmidt-Rimpler. In volume xxii.

of these ARCHIVES, Schmidt-Rimpler, in reporting his case, has cited four cases: Förster's,[1] Schweigger's,[2] Grönouw's,[3] and Vorster's[4]; and, in a discussion of the subject, has presented in his article the essentials of all these cases. The citations at the end of this paper are to the publications containing the original articles. For a study of this subject the material, as original articles or in abstract, may be found in these ARCHIVES as follows: Förster's, in abstract, vol. xx., p. 293; Schweigger's, vol. xx., p. 83; Grönouw's, in abstract, vol. xxi., p. 574; Schmidt-Rimpler's, vol. xxii., p. 313.

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[1] *Gräfe's Archiv*, Band xxxvi., p. 94.
[2] These ARCHIVES, vol. xx., p. 83.
[3] *Archiv für Psych. und Nervenkrankheiten*, Band xxiii., p. 339.
[4] *Allgemeine Zeitschrift für Psychiatrie*, Band xlix., p. 227.

TREATMENT OF STENOSIS OF THE LACHRYMAL DUCT WITH PERMANENT PROBES.[1]

By Dr. WALTER VULPIUS,

LATE ASSISTANT SURGEON TO THE NEW YORK OPHTHALMIC AND AURAL INSTITUTE.

Translated by Dr. C. ZIMMERMANN, Milwaukee, Wis.

TWO cases of chronic dacryocystitis of several years' standing (with conjunctivitis, blepharitis, and ectropium of the lower lid in one) that had been unsuccessfully treated in the ophthalmic department of the New York Ophthalmic and Aural Institute with astringents, were referred to me for a nasal examination. Apparently my ophthalmological colleagues shared the opinion of Dr. de Wecker of Paris in regard to these cases, viz., that the treatment of the lachrymal passages rather belonged to the nasal specialist. He reserves only those cases for the oculist in which probing has remained without success, thus necessitating treatment of the lachrymal gland (French Ophthalmological Congress, 1891). This view may be due to the quite common idea that the treatment of chronic affections of the lachrymal apparatus is very ungratifying. My experience taught me differently, and I rather welcome such cases.

Two methods of treatment of the lachrymal apparatus have been in vogue for quite a long time: (1) the treatment with lotions and injections, as devised by Anel; (2) the restitution of the permeablity of the stenosed or obliterated canal by mechanical means.

Many operators combined both methods, others adopted extreme measures, using very strong caustics, or aimed at dilating the naso-lachrymal duct almost as wide as that of

[1] Demonstration of patients before the German Medical Society of New York, April 1, 1895.

the urethra by probing, cutting, or even filing. In desperate cases extirpation or destruction of the lachrymal sac has been recommended.

Since the two chief methods mentioned above require protracted and most tedious and painful treatment, permanent mechanical procedures suggested themselves. Thus solid, grooved, or hollow permanent probes of various metals were constructed, pieces of catgut or of the long bones of small amphibia were used, but the results were not satisfactory, so that Terson (*The British Med. Jour.*, Oct., 1889, p. 652) attributes to them only an historical interest. While a student I never saw a permanent probe used, except those employed by Schoeler for several hours or half days; Schweigger's and others I knew only from the catalogues of surgical instruments. Under the conditions in which I practised in South America I was obliged to invent a method of my own, without the assistance of an instrument maker. Treatment with Anel's syringe or Bowman's or Weber's probes was impracticable, as my patients could be seen only at long intervals. I modified Schoeler's probe by shortening the projecting end, so that it became less visible at the ocular angle and was less exposed to the touch, especially at night. My probe resembles Bowman's half probe, but its point is blunt and somewhat conical, not olive-shaped. But even this could not be borne long without causing irritation by pressure, so I tried an instrument with a short horizontal part, that lay in the slit lower canaliculus, the vertical part being introduced in the naso-lachrymal canal down to the inferior nasal meatus. The instrument had to be adapted to the individual case—this was the chief point—in order to avoid any pressure. The probe was made of the common alloyed silver, as used by jewellers, which can be smoothly polished and which is not easily oxydized, so that the surface remains unaltered and non-irritating for an indefinite time. Its thickness corresponds to Bowman's No. 5. Both ends are blunt, the horizontal a little flattened towards the eyeball. Its making requires a pair of cutting and bending forceps, a delicate file, and a piece of steel to polish it with. The chief difficulty lies in

the right adjustment of the horizontal part. If this tends to turn from the eyeball, it will evert the lid and prevent the suction of tears by the lower tear point; in the reversed case it presses on the eyeball and may cause decubitus of the conjunctiva. An instrument well adapted may be borne not only for days and weeks but for months and years without irritation, as proven by many former patients as well as by those at present under treatment. One of these was presented shortly after the introduction of the permanent probe, when a colleague doubted whether the probe could be tolerated and whether the cure would be permanent. More than a year has elapsed since then, the probe still lies undisturbed, not noticeable by anybody and nearly forgotten by the patient. In the second case the probe lay for fifteen months: conjunctivitis, ulcerous marginal blepharitis, and ectropium have disappeared without any medication; the tear sac is free from pus or any morbid discharge.

After moderately slitting the lower canaliculus (of course toward the eyeball) and dilatation of the stenosed nasolachrymal canal with Bowman's probes (up to No. 6), or cutting the obliterated canal with Stilling's or Weber's knife, the permanent probe is introduced at the first sitting. If any reaction follows, it is alleviated with cool compresses. Within a few days all irritation should have subsided.

The permanent probe is indicated in all chronic stenoses of the lachrymal passages with their various sequelæ. But even in atonic dilatation with dacryocysto-blennorrhœa without stricture of the sac the permanent probe yielded good results, as it established an excellent drainage, although it is neither grooved nor hollow. In all probability the capillary current is formed between the probe and the wall of the duct. The normal tears seem to effect a physiological metabolism in the diseased mucous membrane of the sac, if it moistens it in a constant stream. In such an atonic case a rapid subsidence of the suppuration was brought about by the permanent probe within five weeks despite several relapses. The patient has now worn the probe for over four years and the blennorrhœa has never returned. The drainage of the permanent probe may be demonstrated by my

CASE 3.—The patient was kindly referred to me by Dr. F. Lange, after she had been sent previously to Dr. W. Meyer for surgical treatment. A fistula at the region of the left tear-sac was found through which a probe could be introduced one and a half inches backward, but also in other directions, so that the existence of a large cavity could be revealed, discharging great quantities of muco-pus. Generally the latter was secreted periodically after a painful swelling of the integument had occurred. At first (April of last year) it had to be liberated by incision several times, before the fistula had been formed. Eight years ago there was an abscess of the upper lid for three months, the cicatrix of which is still visible. The eye was free from pus but not from overdischarge of tears. The supraorbital margin was uneven (besides the incisura), as if from a periostitic abscess. A probe could not be passed through the fistula into the naso-lachrymal canal, so that there was probably no simple dacryocysto-blennorrhœa, but a periostitic abscess, that had broken into the lachrymal sac. Nevertheless I attempted a cure by the introduction of a permanent probe. The lachrymal sac could be entered by the lower canaliculus, but there was no communication with the duct. This as well as an osseous stricture midways in the canal had to be cut with Weber's knife. A probe which was introduced through the fistula did not touch another one inserted into the sac, but fluid injected into one opening oozed from the other. Therefore the cavity seemed to be complicated by membranes which were either newly formed or remnants of the perforated wall of the lachrymal sac. June 10th I introduced the permanent probé, and after two days convinced myself of its right position. I did not see the patient until September 11th, when she told me that from the very day of the operation the periodical suppuration had become less frequent and diminished in quantity, without any other treatment. The muco-pus appeared in the lower nasal meatus, but also less in quantity. Toward the end of September the fistula healed permanently and the suppuration has entirely subsided since the end of October. The probe still remains in the canal without the least inconvenience. In order to be sure, in very inveterate or otherwise obstinate cases I leave the probe for at least a year or even longer.

A BRIEF NOTE UPON A PERFECTED SERIES OF TEST-WORDS INTENDED FOR THE DETERMINATION AND ESTIMATION OF THE POWER OF ACCOMMODATION.

By CHARLES A. OLIVER, A.M., M.D.,

ONE OF THE ATTENDING SURGEONS TO THE WILLS EYE HOSPITAL; ONE OF THE OPHTHALMIC SURGEONS TO THE PHILADELPHIA HOSPITAL, ETC.

(*With a specimen sheet appended.*)

IN 1886, the writer read a paper upon "A New Series of Metric Test-Letters and Words for Determining the Amount and Range of Accommodation" before the American Ophthalmological Society.[1] After seven years' trial with these letters, he so greatly simplified them and lessened their number, that he brought forward a new card of type in these ARCHIVES.[2] The advantages, both then and now, claimed for this series may be summarized as follows:

First.—Each word is composed of three or four letters that are constructed in strict conformity with the Snellen basis of letter formation, thus not only avoiding any errors that may arise from improper characterization, but placing the results upon the same basis as those that are obtained during the testing for distant vision.

Second.—Each column of words has a purposive succession of test-words that are alternately composed, as much as possible, of letters that are preponderant in horizontal and vertical strokes, and in curved ones, thus allowing the tests to be of value in the recognition of astigmatism.

[1] *Transactions American Ophthalmological Society*, 1886.
[2] These ARCHIVES, July, 1893.

Third.—Each grouping of letters is composed of series of words which bear no relation to one another, thus preventing any power of memorizing and avoiding any imperfections in result that may arise from context.

Fourth.—Each test-letter is surrounded by a space which is equal to or greater than the area that is occupied by the letter itself, thus obviating any confusion that may arise from interference of one letter with its fellow.

Fifth.—Each grouping of test-words, which has been made sufficiently great as to allow an adequate change of choice of selection during testing, is graded to a size that permits of easy and quick computation.

Sixth.—The letter surface of the card is surrounded by a broad, raised border, thus in great measure preventing the print from being injured by handling, or soiled by contact with any dirty surface.

Three years of constant employment of this second card resulted in a sufficient number of modifications as to arrangement and enough improvements as to manufacture, to warrant the placing of the present perfected series before the medical profession.

The change in the order of the words; the substitution of a durable black hardwood frame for the rough and easily broken gray card-board mat; the exchange of the movable blocks of letter groupings to a single exquisitely etched steel plate, the work of which will withstand the closest scrutiny through a magnifying lens; the fine white tint, and the even, unpolished, smooth surface of the printed area; and the clear, cleanly cut imprint of the engraved letters with a dead black ink, may all be cited as some of the most important reasons why this series has been issued.

The details of the manufacture of the card have been entrusted to Messrs. Wall & Ochs, of 1702 Chestnut Street, Philadelphia, of whom copies can be obtained.

D-0.50

FELT	LEFT	FEEL	YELL
COOL	LOSE	CODE	DOLE
DEFT	FLOE	LENT	FEET
CLOD	COLT	DOLL	COOT

D-0.75

LEE	ELL	ELF	FOE
COD	TOD	COT	TOO
FEE	LET	EEL	ELL
ODD	COD	LOO	DOE

D-1.00

FELL	TOLL	DELL
DOTE	FOOL	TOLD
FLED	LOLL	CELT
COLD	FOOD	DOFF

D-1.50

FEED	LOFT
LOOT	TOOL
FOLD	DOLT

D-2.00

TOE	OFT
DOD	ODE
LOT	FED

ISOLATED RUPTURE OF THE IRIS, UNACCOMPANIED BY INJURY TO ANY OF THE ADJOINING STRUCTURES.

By WENDELL REBER, M.D., Pottsville, Pa.

(*With wood-cut.*)

INJURIES to the eye, compromising the structure of the iris, are in general severe enough to, at least temporarily, jeopardize the integrity of the whole globe. They are usually wounds at the corneo-scleral margin with coincident tearing on prolapse of the iris. Such conditions are relatively frequent, and form the large percentage of the traumatic cases seen in our eye-clinics to-day. Müller's recent study of "Rupture at the Corneo-Scleral Border" is not without interest in this connection.[1] Laceration of the iris, however, with preservation of the sclero-corneal capsule, is rare indeed. The following history, therefore, setting forth an instance of isolated rupture of the iris, unaccompanied by involvement of any of the tunics or media, will perhaps be of interest.

April 8, 1895.—M. H., æt. thirty-five, a miner; patient states that this morning at one o'clock, while mining coal with a pick, a piece of flying coal, about twice the size of an egg, struck him in the face. He closed the right eye just in time to save the cornea, but the organ was blinded for perhaps half an hour by the force of the blow. The coal happily spent most of its force on the right eyebrow. There was slight pain in the eye, but he finished his work, went to his home about 6 A.M., and retired. On

[1] "Über Ruptur der corneo-scleral Kapsel durch stumpfe Verletzung." Franz Deuticke, Wien, 1895.

arising, about 2 P.M, he noticed that the right eye had been "bleeding inside." His consternation was only increased by the alarm of his family at this discovery. On consulting his family medical adviser he was promptly referred to me.

Status Præsens.—O D: Vision = fingers at 1 *m*. Conjunctiva is rather hyperæmic; the cornea is fairly smooth and regular, but it is a trifle cloudy in its inferior fifth. The anterior chamber is a trifle shallow, and contains blood at its inferior angle. The pupil is irregularly ovoid, its dimensions being 4 x 2½ *mm*, with the long axis at 45°. The iris is moderately mobile to light. At about 1½ *mm* from the inner limbus it shows a linear tear, irregular in its direction and about 4 *mm* in length (see accompanying sketch).

The inferior third of the anterior surface of the iris is concealed by a hemorrhagic exudate. Oblique illumination shows a perfectly intact cornea and sclera. No penetration points to be found anywhere. There is a little brow pain. Tension is normal. The ophthalmoscope, by the indirect method, showed no changes in the fundus. O S (the uninjured eye), normal in every respect.

Treatment.—Atropia, 1 per cent. solution, 2 drops in right eye every three hours. Also hot fomentations to this eye three times daily.

Four days later: Eye perfectly quiet. The rent in the iris cannot now be seen. The blood in the anterior chamber has been entirely absorbed. The ophthalmoscope (direct method) now shows pupil dilated to 7 *mm* and is regularly round. The media are clear; the disc is round, healthy in color, and shows a slight pigment deposit on its outer side; the veins are full and rather dark; the lymph sheaths are distended so as to be easily seen. Choroid and retina normal. Refraction = + 2.00 D S, with which vision to-day = $\frac{5}{13\frac{1}{3}}$, as against $\frac{3}{60}$ four days ago.

Twenty-one days later: Eye normal in all respects.

As there were no abrasions or contusions on the eyelids, the interesting question arises whether the iris rupture

occurred as the direct result of the impact of the coal on the closed lids and cornea, or whether it was due to pressure on the iris exerted from behind [contre-coup]. I incline to the latter idea.

The noteworthy feature of the case is, that a blow sufficient in intensity to completely rend the iris should deal so lightly with the adjoining structures.

The same principle that, in surgery, demands accurate coaptation of the lips of a wound determined the treatment in this case.

The result of the treatment bore out the correctness of this idea. Through the mydriatic action of the atropia, the edges of the iris wound were so intimately approximated that four days after the accident the site of the iris injury could not be made out. At the present writing the eye is normal in its functions. No break in the continuity of the iris stroma can be detected by oblique illumination and a magnifying loupe. The iris response to light and accommodation is prompt and marked.

I can find, in the literature at my command, but one case that presents anything like an analogy to the above. That was a case of isolated rupture of the iris and choroid by a rifle-ball that rebounded from a target at which it had been shot. The case was reported by Dr. C. F. Clark, of Columbus, Ohio.[1]

[1] These ARCHIVES, vol. xviii., p. 12.

GLAUCOMA MALIGNUM.

By Prof. C. SCHWEIGGER, Berlin.

Translated by Dr. Harry Friedenwald, Baltimore.

THE term malignant glaucoma cannot be sharply defined. Von Graefe [1] showed that there are all degrees from the most severe to those in which the course of the disease returns to the normal. The severest cases are those in which intense inflammatory signs make their appearance immediately after the iridectomy, and complete blindness follows. I have already published [2] a number of such cases. It is remarkable that in two of these cases (Cases 25 and 45) puncture of the anterior chamber with complete evacuation of the aqueous humor was well borne, while the iridectomy was followed by the most serious consequences; and yet it is certainly not the cutting out of the piece of iris which produced the malignant course. The following case will serve to prove this:

Case 1.—A lady whose malignant glaucoma I have previously described,[3] returned for treatment in 1892 with glaucoma of the right eye. There were attacks every forenoon of cloudy vision with colored halos, pericorneal injections, and haziness of the cornea. Eserin was used at first without relief. Gradually the attacks became more severe and of longer duration. The field of vision became more and more restricted, the central vision diminished; so finally we had to choose between complete blindness

[1] *v. Graefe's Archiv*, Bd. xv., 3, p. 205.

[2] These Archives, vol. xx., p. 475, "Glaucoma and Affections of the Optic Nerve," Cases 24 to 30 and Case 45.

[3] Case 28, *loc. cit.*

and operative interference. The iridectomy was of course out of the question and a simple puncture has long been shown to be without any effect. The only alternative was therefore a sclerotomy; so far as I knew there was no report of malignant glaucoma after sclerotomy. I therefore suggested this operation to the patient, at the same time expressing an uncertain prognosis. The sclerotomy was made with a small knife in the upper portion of the cornea, in such a manner that a bridge of about *2 mm* was left remaining, while the right and left incisions were each about *2½ mm* in length. This was immediately followed by a very intense inflammation; there was swelling of the lids and conjunctiva; hemorrhage in the tissue of the iris and in the anterior chamber; the pupil remained round but was completely adherent to the capsule of the lens; the anterior chamber remained permanently empty; the scleral wound became ectatic; perception of light diminished; atrophy of the eyeball with complete blindness followed.

All that we can therefore do in cases of malignant glaucoma of one eye when the other eye becomes affected is to use eserin or pilocarpin in order to postpone the blindness as long as possible.

There are all degrees of severity from the most malignant to those with less unfavorable course. The inflammatory signs may be less severe, perhaps not more intense than we may find in otherwise normal cases; but the *anterior chamber remains empty.* It is to be noted that the eye may show no signs of inflammation and vision continue unchanged, even though the anterior chamber remains empty.

Case 2.[1]—Miss S., aged seventeen, of Charkow, was operated upon for chronic glaucoma of both eyes five months before she

[1] This case is the same as that described by Hirschberg, in his *25 jaehriger Bericht*, 1895, p. 27. As this case is very interesting the translator takes the liberty of adding a translation of the history as given by Hirschberg:

On October 30, 1890, Miss S., a student, aged seventeen, was admitted for treatment. For five years she had suffered while at the "gymnasium" with asthenopia after continued reading or writing, but nevertheless was able to take her examination and entered the university. After five months she was operated upon in both eyes on account of chronic glaucoma with iridectomy at one sitting, since which time she is almost blind. R E counts fingers at fifteen feet and field concentrically contracted to about 3° to 5°. L E has but perception of light. In both eyes anterior chamber is empty, corneal surface rough, optic nerve pale and papilla excavated and eyes very much irritated.

was first seen by me on October 8, 1890. At this time the right anterior chamber was almost completely empty; vision $= \frac{1}{20-7.5}$; read No. 1.75 with difficulty; field of vision very narrow; continued state of irritation; deep excavation of papilla. The left anterior chamber was completely empty; vision almost 0, only movements of the hand are seen. Both pupils were drawn upwards.

Four years later, May 4, 1894, the condition was unchanged. R E V $= \frac{1}{10-7.5}$; read No. 1.75 with difficulty; field of vision very narrow; movements of the hand were seen. In the right eye there was a minimal amount of aqueous humor; pupil transparent; optic discs white and excavated; the irritation had disappeared. The left anterior chamber was completely empty; iris lay directly against the cornea; accumulation of pigment in pupillary area; with the ophthalmoscope only a faint red reflex. It could not be determined before the operation what the vision was. At any rate the condition had not gotten worse during the four years after the operation.

In the following case we have the advantage of knowing the condition before the operation:

Case 3.—Mrs. Louise G., aged thirty-one, presented herself during the middle of May, 1895. Both anterior chambers were completely empty. In both eyes the papilla was deeply excavated. The right eye could count fingers at about 20 *cm* with a very narrow field of vision. The left eye had but slight perception of light. It was therefore important to learn what the condition was before the operation.

The following is the report of Dr. Augstein of Bromberg:

Mrs. L. G. has suffered regularly at every menstruation during the past nine years (since the birth of her last child) with severe headaches; these were usually left-sided and associated with marked lachrymation and redness of the eye of the same side. These attacks lasted several days and then passed off. In the summer of 1893 she discovered, on closing the right eye that the left eye was completely blind. On the 26th of September, 1893, the condition was as follows: Both eyes were free from irritation; there was a decided increase of intra-ocular tension; the anterior chambers were normal; the left pupil was of medium

size, the right somewhat narrow ; there were excavations of both papillæ. In the left eye there was slight perception of light. R E V = $\frac{4}{12}$ with narrow field of vision, (about 10° in all meridians). September 29, 1893, an iridectomy upwards was made in both eyes, without lessening the intraocular pressure ; the anterior chambers remained empty. November, 1893, vision = $\frac{1}{12}$; field of vision, unchanged. During October, 1894, there was a very severe attack of glaucoma in the right eye which was much improved by eserin. In August, 1895, there was an equally severe attack of glaucoma in the left eye ; the pain subsided under eserin. In September, 1895, there was some pericorneal injection and slight pain in the right eye. The left eye was free from irritation. The intraocular tension was raised, more in the right than in the left eye. Both anterior chambers were completely empty. There was a smooth cicatrix in both eyes ; the irides were atrophic ; beginning cataract rendered the ophthalmoscopic pictures very indistinct. The left eye had slight perception of light. In the right eye movements of the hand could be seen when close to the eye. The immediate injury of vision due to the iridectomy was therefore less than that resulting from the subsequent attacks of acute glaucoma.

Case 4.—A workman, aged sixty-two, came for treatment in February, 1892. He had had attacks of obscuration of vision of the left eye and of seeing colored halos for years. R E + 1.25 D cyl. V = $\frac{6}{12}$; field of vision defective above. L E V = $\frac{6}{36}$ probably eccentric, for with 3 he could read 1.25 with difficulty. There was only a narrow horizontal band of the field of vision remaining ; upwards and downwards it extended to about 20°, on the temporal side to 50° ; on the nasal side the margin lies close to the point of fixation. There is no cataract ; a deep excavation is seen reaching to the margin of the papilla in the nasal and upper parts. During same examinations arterial pulsation was noticed. February 16th an iridectomy was made in the left eye. The process of healing was normal, excepting that the anterior chamber remained empty. During the middle of March, there was a minimal amount of aqueous humor on the temporal side in the left eye ; the pupillary margin seemed to be pushed forward ; opacity of the lens increased and vision became worse. In the early part of April the vitreous was punctured with a narrow knife, above and in front of the equator. The anterior chamber became re-established. V = $\frac{1}{20}$ eccentric. The anterior chamber remained

filled as long as the scleral wound was bulged out by the vitreous ; but after four weeks the scleral wound was firmly cicatrized and the anterior chamber was again empty, and remained so. V $= \frac{1}{20}$. This experiment proves that it was increased pressure within the vitreous that prevented re-establishment of the anterior chamber. If the lens is extracted in such cases an experiment which I have tried when there was likewise cataract, the anterior chamber remains permanently filled because the lens can no longer be pressed forward.

Puncture of the vitreous was practised by von Graefe,[1] but it is only incidentally mentioned by him probably because of its lack of therapeutic importance. The further development of this operation by adding the procedure of pressing upon the cornea with intent to press the lens back, depends upon the idea that the malignant course is due to a dislocation of the lens into the depression between the ciliary body and the insertion of the iris. It is well known that in chronic glaucoma an iridectomy may be followed by emptiness of the anterior chamber for from six to eight days (without producing any other abnormality in the process of healing), and subsequent re-establishment of the anterior chamber in a perfectly normal manner. If, as in Case 2, the anterior chamber remains empty for four years after the operation without any other change and with retention of the same amount of vision as after the operation, it is evident that the closure of the angle of the anterior chamber can play no important part in the pathological process.

The cases in which a malignant course occurs are for the most part chronic glaucoma ; still I have seen the same malignant character in cases of intense glaucomatous inflammation.

There is another series of cases whose course is likewise of a very malignant nature, namely those in which *the eye is destroyed by intraocular hemorrhage following an iridectomy.* This may likewise occur in the extraction of cataract with or without iridectomy. When we consider that extraction is performed much more frequently than iridectomy, but that hemorrhages are more often met with after iridectomy

[1] *v. Graefe's Archiv*, Bd. xv., 3, p. 306.

for glaucoma, we are forced to conclude that there must be some relation between them and the glaucomatous process. These profuse hemorrhages can only come from large vessels, and it is probable that disease of the large choroidal vessels is the cause. There seems to be a predisposition in these cases for both eyes to take the same course whether the operation is for cataract or for glaucoma; this we should expect since vascular diseases as a rule affect both eyes. It is especially that form of glaucoma occurring after hemorrhage of the retina as well as that known as hydrophthalmus, in which this accident occurs; however, it may likewise happen in cases of chronic glaucoma. As an example I shall relate the following case:

CASE 5.—Mrs. H., aged seventy-six, lost the sight of the right eye through chronic glaucoma in 1877. In 1884, there were also attacks of hazy vision with the appearance of colored halos in the right eye. An examination, September 8, 1894, showed a cloudiness of the cornea in the left eye with a narrow anterior chamber and pupil not dilated; the anterior perforating veins were widened; there was increased intraocular pressure; loss of light perception; no reflex with ophthalmoscope. Right eye: Hypermetropia of $2\frac{1}{2}$ D; V $\frac{5}{15-10}$; field of vision normal. Attacks of glaucoma recurred frequently in the right eye and so question of making an iridectomy was considered; however, according to a rule which I have laid down,[1] never to operate on both eyes for double glaucoma at one sitting, I decided to operate first upon the left eye, although there was neither pain to be relieved nor sight to be gained, but simply as a test of a possible malignant course. On October 27th, an iridectomy was made with a small knife upwards. On the next day there was some blood on the bandage, in itself nothing remarkable; but besides this the nucleus of the lens and some cortical matter lay in the anterior chamber; an intraocular hemorrhage had torn the zonula and capsule of the lens and forced the nucleus into the anterior chamber. During the night of October 31st, there was another profuse intraocular hemorrhage which emptied the vitreous. In order to hasten the process an evisceration was performed a few days later. The pilocarpin treatment of the right eye, in which attacks of glaucoma recurred, was continued. On September 16,

[1] These ARCHIVES, vol. xx.

1895 (during the afternoon), I found the right eye in a very good condition; the pupil was contracted from pilocarpin. V + 1 Dv = $\frac{1}{25-20}$. A one per cent solution of eserin was instilled hourly, later five to six times daily. There was gradual improvement. September 25th, V = $\frac{6}{9}$; hyperæmia was still present. It was not until the second week in October that the eye returned to its previous condition.

As regards the prognosis of the iridectomy for glaucoma following retinal hemorrhage, I must repeat that I have found it by no means so unfavorable as is usually stated. As a further proof of this I will describe but one case.[1] The case also shows in how short a time a glaucomatous excavation may develop.

Case 6.—Mr. H. aged sixty-four, of Zittau, noticed the appearance of a veil before the left eye during the latter part of July, 1894. Examination August 4th: V of both eyes was found to be equally good; with + 1 D c ax. vertical = $\frac{1}{10-7.5}$. In the left eye there were hemorrhages of the retina near the optic discs and in the periphery. The papilla of both eyes was flat; there was but a small central pit. Skiascopic examination showed a myopia of 1 D in the horizontal and emmetropia in the vertical meridian. On October 15th the left eye suddenly became worse, perhaps in consequence of excitement attending the wedding of his daughter. He had never observed cloudiness of vision nor the appearance of colored rings. On October 28th there were recurrent attacks of severe pain.

On November 15th when I saw the patient again there was intense glaucomatous inflammation of the left eye; the cornea was very cloudy, the pupil dilated; there was marked increase of intraocular pressure; no reflex with ophthalmoscope. Fingers could not be counted, but movements of the hand were seen in the temporal half of the field of vision. The right eye was unchanged. Although there was no hope of improving vision, an iridectomy was performed on November 17th for the relief of pain. The course of healing was perfect; on November 25th the media were clear; there were a few hemorrhages in the retina and movements of the hand were seen in the temporal half of the field of vision. There was complete excavation of the papilla.

[1] The former cases will be found in these Archives, vol. xx.

In May, 1895, there was not the slightest perception of light in the left eye. An earlier iridectomy would probably have preserved more vision; in this case the operation did all that could have been expected, and proved that the fear of an unfavorable result of the operation in glaucoma following retinal hemorrhage is greatly exaggerated.

The same may be said of iridectomy for hydrophthalmus in childhood. It is the rule for the course to be normal after a proper operation. As the anterior chamber is very deep in these cases we must depart from the rule of making the iridectomy as peripherally as possible. I am in the habit of making an incision with a keratome close to the corneal margin. Only one eye is operated upon at first, and that the worse one, in order to test the course of healing. Hemorrhages of the vitreous occur very rarely and in these cases we allow the second eye to follow its own course without operation; for the malignant predisposition is found even in these cases to affect both eyes. However we must note that that which is first seen is the hemorrhage into the anterior chamber, which in itself by no means proves a deeper intraocular hemorrhage. It may take some time for the hemorrhage to be absorbed from the anterior chamber. As an example I shall relate

Case 7.—Elsie H. aged four, came under treatment January, 1895, with congenital hydrophthalmus of both eyes. In the left eye there was a dense corneal opacity and in the right a fine streamy cloudiness of the cornea. The papillary reaction was normal. The left background could not be seen; in the right there was an excavation of the papilla and arterial pulsation. January 29th, an iridectomy was made in the left eye; on the following day the anterior chamber was completely filled with blood. In order to hasten the course the anterior chamber was punctured on February 6th but without completely evacuating the blood. It was not until the middle of March that the anterior chamber was completely freed from blood. At this time the anterior chamber was as deep as before the operation, the cornea less cloudy; with the ophthalmoscope there was a red reflex; the background was not visible. However, as it had been shown that no hemorrhages had taken place in the vitreous, an iridectomy was performed on

the right eye on the 20th of March. No hemorrhages in the anterior chamber followed. The course of healing was normal. In the early part of October both eyes were in a good condition.

We must not forget that the unfortunate accidents described above are very rare exceptions, which dare not be considered as contradicting the iridectomy. In a large majority of cases we may expect permanent cure of the glaucoma from the iridectomy, and if useful vision was present to preserve it. This statement, however, applies only to cases of true glaucoma. In most cases in which the result of the iridectomy is unsatisfactory, it is the so-called simple glaucoma, a disease which very frequently is not glaucoma at all, but an affection of the optic nerve with pre-existing physiological excavation. It is exceptional to find cases of true glaucoma in which after iridectomy glaucomatous attacks recur and lead to blindness. When gradual loss of sight occurs after an iridectomy for glaucoma without distinct glaucomatous attacks, it is proper to assume that an affection of the nerve has developed after the removal of the glaucomatous process, and this naturally may occur in eyes with iridectomy as well as in others.

Attempts have long been made to replace the iridectomy for glaucoma by some other method. Sclerotomy was first suggested upon the assumption that the important part of the operation lay in the incision at the sclero-corneal margin and not in the excision of the iris. An important argument for sclerotomy consisted in the fact that an iridectomy in itself always produces diminution of vision, depending upon the astigmatism due to the corneal scar. This form of astigmatism, however, is as corrigible with cylindrical glasses as is the congenital form. Sclerotomy, moreover, also produces traumatic astigmatism and likewise reduces vision. The circles of diffusion produced by the astigmatism may be greater and more irregular with an iridectomy, though the difference is not great. Judging from my experience, sclerotomy is an absolutely unreliable operative measure for glaucoma and does not prevent recurrent attacks. Even those who defend the operation of sclerotomy concede that frequent repetitions of the operation are necessary. If, on

the other hand, an iridectomy will serve in a single operation, why should we resort in the majority of cases to sclerotomies?

The latest attempts to replace the iridectomy are with eserin. Slight attacks of glaucoma can be cured with eserin or pilocarpin, a fact as well known as that severe attacks withstand these remedies. To speak of the case in which the attack of glaucoma was removed by eserin as cured, is as correct as to speak of the spontaneous cure of glaucoma because slight attacks frequently disappear of their own accord. Glaucoma can be said to be cured only when the attacks are entirely prevented, and the *only method* by which this is accomplished is iridectomy. It is really very improper to try a palliative measure for years only to avoid using a proved remedy. That eserin may be used for many years with constantly recurring attacks cannot be doubted. In one of my cases nine years passed without the use of any palliative measure before a severe attack occurred in which eserin was without any action, and an iridectomy had to be performed. At any rate, the patient who is treated with eserin must constantly remain under observation, and at the first appearance of a severe attack the operation must be performed. For it may happen that after several slight attacks a very severe one may occur with immediate danger of blindness. It is more frequent, however, to find that recurrent slight attacks finally lead to blindness, perhaps without the patient being conscious of it. In these cases of very gradual visual impairment central vision remains good for a long time, the field of vision becoming more and more restricted. I have seen cases in which there was fair central vision with a minimal field after the continued use of eserin for years.

The advice H. Cohn[1] has given to general practitioners, to use eserin as soon as colored halos are observed, necessarily leads to confusion; for the seeing of colored halos, though a very important symptom of glaucoma, is by no means characteristic. The same phenomenon occurs in conjunctival diseases, though not, as Cohn believes, in the cases of marked conjunctival catarrh; it would be much more fre-

[1] *Berlin. klin. Wochenschr.*, 1895, p. 21.

quently noticed. It is rather in those cases of chronic conjunctival hyperæmia with very slight secretion that we find it. I have had cases under continued observation in which colored halos have been frequently seen without being able to find any lesion whatever. Attacks during which colored rings are seen are characteristic of glaucoma only when there is at the same time diminution of sight and a steamy cloudiness of the cornea.

Cohn is mistaken when he states that Hirschberg was the first to explain halo vision as the result of corneal opacity.[1] In the fourth edition of my hand-book (p. 531), published in 1880, I attributed the seeing of colored rings to corneal cloudiness; and later[2] I gave the unquestionable proof by the fact that in iritis with slight corneal opacity (which reduced vision not more than to $\frac{1}{6}$), colored rings are often seen when the healthy eye is closed and the patient looks at a lamp burning low; the colored rings are seen in glaucoma only when the corneal cloudiness is slight, not in severe attacks. When Hirschberg[3] states in opposition to me that colored rings may be seen in simple glaucoma, I reply that the œdema of the cornea which underlies this phenomenon of diffraction is unquestionably a sign of inflammation; for the same corneal œdema is almost always seen in iritis. Even when conjunctival hyperæmia or pain is not present, we must therefore regard this as an inflammatory sign; the absence of these symptoms by no means excludes the presence of inflammation within the eyeball. Choroiditis usually runs its course without any visible external signs of inflammation. Even in cyclitis this may be the case, for when punctiform deposits are found on the membrane of Descemet together with vitreous opacities close to the lens without any abnormality in the iris, we must assume that the source of exudation is in the ciliary body, even though external signs of inflammation are absent. Even in iritis with a widely dilated pupil from atropin we frequently find all external signs of inflammation wanting, although the iritis continues and can

[1] *Deutsche med. Wachenschr.*, 1886, Nos. 3 and 4.
[2] These ARCHIVES, vol. xx. (Germ. Ed., vol. xxiii.).
[3] *Deutsche med. Wochenschr.*, 1886, p. 34.

be demonstrated by withdrawing the atropin too early. Posterior synechiæ are commonly regarded as consequences of iritis, though we find them occurring in choroiditis without any external signs of inflammation. Our conception of inflammation is, after all, not sharply defined, and there is certainly no reason why we should give the term narrower limits in glaucoma than we are accustomed to assign in other diseases.

For this reason I have classed the corneal opacity in glaucoma under the signs of inflammation in the fifth edition of my text-book, p. 490. Those cases in which it is present are embraced under inflammatory glaucoma. The seeing of colored halos, like all other symptoms, is not in itself a proof. We must depend in all cases upon a connected series of signs to make a certain diagnosis of glaucoma. *And when glaucoma has been positively demonstrated, then iridectomy is indicated,* and there is no sense in first losing time in using eserin and finally to perform an iridectomy, when, as Cohn very properly states, the prognosis is much less favorable.

ON MEDULLATED NERVE FIBRES IN THE RETINA.

By Prof. MANZ, Freiburg.

Translated by Dr. Ward A. Holden.

(*With two lithographic plates, I. and II., Vol. XXIX., Germ. Ed.*)

TWO years ago I made an anatomical examination of the eyes of two patients in whose retinas I had in life noted the presence of medullated fibres, and last year I had the opportunity of examining another similar case. I have no accurate data in regard to the function of these eyes, although all the patients were inmates of an almshouse, where they were employed in various household duties and in sewing on small porcelain beads. The abnormalities were discovered, not through any complaint on the part of the patient, but in the routine ophthalmoscopic examination of all the patients.

In my own experience and in that of others no disturbance of vision has been found in these cases, and I have often been unable to make out an enlargement of the blind spot which some observers have reported.

Ophthalmoscopic descriptions and drawings of this condition we have in plenty, but so few anatomical reports have been made on it that a description of three new cases will certainly be welcome.

The subject has interested me particularly because I have found medullated nerve fibres frequently in persons with an abnormal condition of the central nervous system, especially in idiots, and these three last patients—two men and a

woman—showed in their attitude, facial expression, and speech a certain degree of idiocy; although, of course, opaque nerve fibres are also found in persons with healthy brains.

We owe the first anatomical description of this retinal condition to Virchow,[1] who, in making an autopsy on a man with obstruction of the left carotid, discovered several white patches near the disc, composed of dark-margined nerve fibres. While usually in this region only fine pale transparent nerve fibres are found, in this case some of these fibres were broad and provided with a medullary sheath. Virchow found that the optic nerve contained only non-medullated fibres in its passage through the lamina cribrosa, but that in the retina some of the fibres regained their medulla by degrees, there being no sharp line of demarcation between the medullated and non-medullated portions. In chromic acid preparations the medullated fibres showed numerous swellings due to "lifting of the membrane," but even the pale fibres were swollen here and there in spindle form.

A later description of a similar case by Beckmann[2] is less detailed, and is based on Virchow's description. A more detailed report was given by v. Recklinghausen,[3] of the eye of a painter with weak sight, in whose left retina there was a rhomboidal white patch, composed of medullated fibres, lying 4 *mm* from the nasal margin of the disc—an exceptional location. The dark-margined nerve fibres were arranged in almost parallel bundles, and had few varicosities. The medullated part was about 5 *mm* long, and sharply limited, the medullary sheath ceasing abruptly. No other pathological changes were found in the retina.

By this time a number of oculists had seen with the ophthalmoscope the peculiar picture presented by opaque nerve fibres which had already been drawn by Jaeger,[4] who, however, did not know its significance.

The fact announced by Virchow that these nerve fibres

[1] *Virchow's Archiv*, vol. x., p. 170.
[2] *Virchow's Archiv*, vol. xiii., p. 97.
[3] *Ibid.*, vol. xxx., p. 375.
[4] *Beiträge z. Path. des Auges*, pl. xiii.

have no medulla where they pass through the lamina cribrosa was confirmed in 1874 by Schmidt-Rimpler,[1] who made an anatomical examination in a case that he had studied with the ophthalmoscope. The medullated fibres showed large varicose dilatations. They formed the inner stratum of the nerve-fibre layer, but were mingled with the non-medullated.

The ophthalmoscopic picture in my cases did not differ materially from the ordinary. In the first patient, pure white, flame-like figures were situated at the upper and lower margin of the disc, in the second the figure surrounded the entire disc, and in the third it was below the disc. In so far as the optic disc was not covered at its margin by the fibres, its form and limits were normal. The vessels were partly or altogether concealed in passing through the opaque fibres, but were elsewhere of normal appearance. The eyes were all otherwise normal, excepting in those of one patient, who had had an anterior inflammation, leaving opacity of the cornea, atrophy of the iris, and synechiæ. The vitreous was normal.

In the case of two eyes that I put, years ago, into osmic acid, it seemed that a much greater number of the fibres were stained black than the ophthalmoscopic picture would have led one to expect, and that the black fibres extended very far out into the retina. Much more reliable results were obtained in these later cases by hardening the balls in Müller's fluid and alcohol, and staining the sections by some of the newer methods.

The first preparations so made were from a young man who had been an inmate of the institution for years, and had been often shown by me in ophthalmoscopic courses. He gave the impression of being to a certain extent idiotic, and was commonly so thought to be; and even early in life he had had to do with courts of justice. Morbid changes were found in the brain and kidneys. The balls were hardened in Müller's fluid, and the sections were stained partly with osmic acid, partly with Kultschitzky's fluid—the latter giving very clear pictures by staining the medullated fibres

[1] *Klin. Monatsbl. f. Augenh.*, 1874, p. 186.

blue. The bundles of blue nerve fibres end abruptly at the lamina cribrosa, and a small number of fibres in the retina near the margin of the disc appear blue, while all the others are unstained.

In sections stained with Kultschitzky's hematoxylin and eosin, the framework of the nerve and the nerve sheaths, the lamina cribrosa and the sclera were stained bright red, the choroid a paler red, the retinal layers blue of various intensities, the outer pale, the inner granular layer darker. The nuclei were scarcely colored. While in general it may be said that the blue color ends abruptly at the lamina cribrosa, in some bundles the color extends into the meshes of the lamina cribrosa, and in a few bundles it begins again directly in front of the lamina cribrosa, although for the most part it appears first near the margin of the disc or beyond it. Specimens stained with osmic acid and those stained by Weigert's method are similar in this respect.

The medullated fibres in the retina run a number of them together in a tract, and also as single fibres, lying mostly in a plane, but some of them extending transversely and crossing the non-medullated fibres. Although the medullated fibres extend frequently along the course of the greater vessels, as we see with the ophthalmoscope, I have not been able to find any other relation existing between them (Fig. 2 *v*).

The medullated fibres are uniformly thicker than the non-medullated fibres of the retina, and even thicker than the average fibre in the nerve. All have numerous varicose swellings of various sizes, mostly spindle-shaped with the axis of the fibre, while some lie on one side of the fibre. These varicosities are from 0.01–0.015 *mm* in diameter. The margins of the varicosities are dark, the centres lighter, indicating the staining of the sheath only, while the axis-cylinder remains unstained. No branching of the fibres was found.

The relation of the medullary sheath to the axis cylinder was revealed by its behavior when stained by Weigert's method and the medullary stain of Dr. Stroebe with anilin blue and safranin.[1]

[1] *Centralbl. f. path. Anatomie*, 1893, vol. iv., No. 2.

Dr. Stroebe had the kindness to stain a number of sections for me by each of these methods, which showed conclusively that *the varicosities are swellings of the axis-cylinders and not of the medullary sheaths.* The nerve fibres in the optic nerve appear blue, in the lamina cribrosa paler, and in the retina still more palely stained, and all are thinner than in the preparations stained by Weigert's method, and the varicosities are very numerous and on the average narrower than in Weigert preparations.

In the left eye of the third patient, the right having corneal opacities, the white figure could be seen with the ophthalmoscope only at the lower margin of the disc, but in the sections some medullated fibres were found running upward. This fact would lead one to suppose that perhaps even in eyes of normal appearance medullated fibres might be present in small number, although undiscoverable with the ophthalmoscope, at least in the inverted image.

As I have said before, the lamina cribrosa proves for the most part the anterior limit of the medullated fibres, although single fibres take on medulla again in front of the lamina cribrosa, and some entire bundles of fibres retain their medulla throughout. This was particularly noticeable in my second case. The disc here was surrounded by a white figure 7 *mm* high and 4–5 *mm* broad. The central vessels were almost all concealed in the white mass where they pass through it. The sections were stained by Kultschitzky's method, and a number of bundles of fibres were found which preserved their blue color in passing through the lamina cribrosa, thus furnishing anatomical proof of Schmidt-Rimpler's supposition that certain sector-formed white figures in an otherwise normal disc may be composed of medullated nerve fibres. This would hold good of course only when such medullated fibres appeared also in the surrounding retina.

The retina was otherwise normal except for the presence of formations that have been described in the retina and optic nerve by many authors as corpora amylacea. These are globular structures of homogeneous hyalin appearance and 0.013–0.018 *mm* in diameter. In this case these struc-

tures were present in great number in the disc, and when carefully studied (Fig. 2, *b* and *d*) they were found to be nothing else than varicosities in the axis-cylinders, showing all the transition forms from an ampulla-like swelling to a globular mass attached by a narrow pedicle to the fibres (Fig. 2, *a* and *c*). The various medulla-stains color these globules, indicating that the latter are covered with a thin layer of medullary substance.

Thus while ophthalmoscopically this picture would appear to depend on the abnormal presence of medulla on some optic-nerve fibres, microscopic study shows a "degeneration" of the axis-cylinders, that portion of the nerve fibres which, in the opinion of the majority of histologists, passes from the lamina cribrosa into the retina without any envelope. To my mind these varicosities are not identical with the round bodies found in atrophic optic nerves and called corpora amylacea by Leber, who considered them to be a product of the degenerated nerve fibres.

As to the nature and genesis of opaque nerve fibres in the retina, I believe with most observers that it is congenital and is to be regarded as a malformation. For this view speak the constancy of the ophthalmoscopic picture, the absence of other transitory changes in connection with it, the absence of variable visual disturbances, and the sharp limitation of the affected spot from the surrounding normal retina. From these facts one would conclude that it was a stationary anomaly, although it has been rarely seen in the young, and v. Kölliker thinks it not improbable that the opaque fibres are developed only in adults, as they develop, for example, in the uterus.

Those who consider the globular bodies to be a product of degeneration of the nerve fibres would incline toward the belief that the opaque fibres had developed late, but the fact that with this condition there is so often present a functional disturbance of the central nervous system dependent upon abnormal embryonic development, leads me to hold more strongly to the view that the presence of opaque nerve fibres in the retina is a congenital malformation.

In conclusion a few words may be said in regard to diag-

nosis, which is generally easy, although there is a possibility of confounding opaque nerve fibres with the white circumscribed infiltration accompanying a neuro-retinitis, or that sometimes found in retinitis albuminurica, although the normal condition of the pupil, the central vessels, and the remainder of the fundus, when seen in the upright image, should prevent such an error being made.

Explanation of the Figures.

FIG. 1. The optic-nerve entrance from Case I., stained by Weigert's method. *F*, *m.*, medullated fibres in the retina, the medullary substance staining black.

FIG. 2. From Case I. A blood-vessel in the retina surrounded by medullated fibres with varicosities; some spherical (*b*, *d*), some spindle-shaped (*a*).

FIG. 3. A section from Case III., stained by Kultschitzky's method, showing a number of bundles of fibres which still retain their medullary sheath after passing through the lamina cribrosa.

A CONTRIBUTION TO THE ETIOLOGY AND ANATOMY OF PSEUDO-GLIOMA OF THE RETINA.

By Dr. CRAMER, of Cottbus, and Dr. SCHULTZE, of Frankfurt-on-the-Oder, Germany.

Translated and abridged by Ad. O. Pfingst, M.D., New York.

(*With Plate IV. of Vol. XXIX., Germ. Ed.*)

IN view of our scant knowledge of the so-called pseudo-glioma and of the frequency with which this condition is confounded with true glioma, we feel justified in reporting the following case, which may prove instructive:

The patient, a girl of fifteen years, presented all the symptoms of true glioma. The pupil of the right eye was widely dilated and did not respond to light, though there was consensual reaction. Behind the clear lens, along its entire surface, a light yellow, uneven mass was seen. With the aid of a lens, numerous minute blood-vessels could be distinguished running over the surface, as we find them in glioma. They bore no resemblance to the vascularization found in inflammatory conditions. There was no hemorrhage. Tension was normal. No sensitiveness on pressure. S = o. The lids, conjunctiva, and movements of the eye were unaffected, nor were there any remnants of pigment on the anterior surface of the lens to indicate a previous inflammation of the iris. The left eye was normal.

The girl has had marked chlorotic symptoms in the last two years. With the exception of measles, which she had ten years ago, she had previously been well. A year ago she had a mild attack of tonsillitis while nursing a sister sick with scarlet fever.

The yellow reflex from the depth of the eye had first been

noticed a few weeks ago. The patient had not been aware of the absence of vision in her right eye. There had never been any inflammatory symptoms.

Applying the differential signs of pseudo- and true glioma to our case, we found that, with the single exception of the age of the patient (glioma has never been observed after the twelfth year), everything indicated the presence of true glioma.

The tension is, as we know, normal only in the first stage of glioma, soon to become increased, whereas in pseudo-glioma it becomes diminished, to remain so, the eye becoming smaller.

In our case there was no diminution of tension, although the yellow mass on the interior had been observed some time previously. We considered this, at the time, as an almost positive evidence that we had to deal with a glioma.

In studying the literature since then, we found that, in exceptional cases of pseudo-glioma, the tension is increased (Saemisch, *Arch. f. Augenheilk. u. Ohrenheilk.*; Raab, *Arch. f. Ophth.*, xxv.; Collins).

The footprints of an inflamed iris upon the lens have been considered by some as a pathognomonic sign of pseudo-glioma. In our patient there was no sign of such.

The previous history, to which much importance has been attached as a diagnostic symptom (Leber, Graefe-Saemisch, Hirschberg: *Markschwamm der Netzhaut*), was also negative in our case. There had been no local inflammation nor a constitutional trouble to account for the development of pseudo-glioma.

It is true, a suppurative choroiditis may have followed the scarlatina, which the child had ten years previously, but it is natural to suppose that the same would have been noticed earlier, and that there would have been phthisis bulbi.

The shallow anterior chamber, degeneration of the iris, crater-shaped pupil with adhesions to the lens, smooth, shining mass on the interior with irregular distribution of blood-vessels, and appearance of white areas on the surface

(Hirschberg), some of the other symptoms of pseudo-glioma, were all absent in our case.

We enucleated the eye of our patient and preserved it in alcohol. The examination of the same revealed a total detachment of the retina. But a small portion of the vitreous remained behind the lens (*G*). The rest of the eye was filled with a white granular exudation (*E*). The choroid was intact in almost its entire extent. Near the optic nerve it presents a disc-like thickening of a dark appearance (Figs. 1 and 2 *H*). The other parts are apparently normal. Imbedded and cut in horizontal sections the cornea and sclera were found microscopically to be normal. The anterior chamber was moderately deep and partially filled with a granular coagulated exudation. The iris was adherent to the cornea at its periphery in almost its entire circumference. Ciliary body was atrophic. The lens contained near its anterior surface several small cavities filled with a granular exudation. The detached retina was atrophic and showed a fibroid degeneration, only the two granular layers remaining unchanged.

The principal changes were found in the choroid. This layer began at the ciliary body as a broad band made up of a pigmentary layer and, external to the same in close proximity to the sclera, of a fibrous layer.

The pigmentary coat was separated into two layers for about 3 *mm*, forming a cyst, which was filled with a coagulated exudation (Fig. 1, *C*). Beyond this the atrophic and degenerated choroid, as well as the retina, which accompanied it for a short distance, showed a marked infiltration of small round cells. Scattered through the same were some pigment granules, coagulated exudation, and occasional heaps of cystoid pigment epithelial cells.

In the posterior third of the eye, where the retina was fully detached, the choroid was transformed into dense connective tissue, particularly near the medial surface.

The fibrous bands inclosed pigmentary granules and small spaces filled with a delicate network of the same tissue. The degeneration was most marked near the optic nerve, where the choroid had reached the thickness of the sclera.

Close to the nerve it contained an oval deeply pigmented mass, which, on its lateral end, projected conically into the eye. By making a series of sections this area was seen to extend around the optic nerve, the retina entering from the centre of it. Externally to it, the rest of the choroid could be seen as a narrow pigmentary layer. No blood-vessels were visible in the entire choroid. The pigmented mass referred to was enclosed in a fibrous capsule and was made up principally of brown pigment cells, and small round cells. The pigment was found more abundantly near the capsule. Near the centre were numerous round and oval, and some slit-like, cavities extending in different directions. The latter were found throughout the entire degenerated choroid and always surrounded by pigmentary and round cells. In thin sections, and with employment of high power, these slits were frequently seen to lie in close proximity to, or contained within, giant cells. The cells varied in size and form. Several of the slits were sometimes found in one cell (Fig. 3). The small spaces were always empty while the large ones were occasionally filled with delicate parallel bands of fibrous tissue, between which small dark bodies, simulating nuclei, were sometimes seen (upper cell in Fig. 3).

Contained within the pigmented area, already referred to above, we found epitheloid cells, surrounded by pigment cells and connective tissue, which may justify us in looking upon it as granulation tissue. Near its centre were granular cells whose fat had been dissolved by the alcohol. These were found throughout the degenerated choroid.

Briefly recapitulating, we see that we have had a total detachment of the retina. The ciliary body was atrophic. The iris was adherent to the cornea at its circumference. The choroid, which presented a cystic dilatation just behind the ciliary body, showed a fibrous degeneration in its entire extent. Here and there there was a focus of acute inflammatory products, and on each side of the optic nerve a peculiar area of accumulated pigment and round cells, through which were scattered numerous giant cells containing slit-like cavities or spaces.

This tissue originated, no doubt, in small abscesses which

had not become fully absorbed. The pigment had its origin in the pigment cells of the choroid and retina. There were at least no granules of hæmatoidin to indicate its origin from the blood, nor did the ferrocyanide of potash test show the presence of blood. The slit-like spaces referred to were most likely filled with crystals, which the alcohol had dissolved. The delicate fibres found in the larger ones most likely aided in the formation of the crystals. They were, we assume, cholesterine crystals, which we know to be frequently found in old abscess cavities, where they are formed by the decomposition of fats. Cholesterine and tyrosine crystals are not infrequently found in degenerated vitreous (synchisis scintillans). Their origin there is unknown. It is not impossible that they also originate in some old focus of inflammation in the unveal tract (*Graefe-Saemisch*, iv., 696).

The giant cells owe their origin to the presence of the old abscess acting as a foreign body. That the presence of a foreign body is capable of producing giant cells has repeatedly been shown by experiments with pieces of sponge, pitch, etc.

C. Mayer (Ziegler's *Beiträge*, 1893) observed cells with apertures similar to ours in nodules in the peritoneum, after the introduction of a foreign body. In the fresh specimen he was able to detect cholesterine within the cells.

Thoma (*Virchow's Arch.*, 105) observed similar spaces in atheromatous abscesses of the arteries upon dissolving out the cholesterine. They were also present in Greef's specimen of intraocular cysts (*Arch. f. Augenh.*, xxv.), but were looked upon as rents in the tissue at the time.

More recently P. Manasse (*Virch. Arch.*, vol. cxxxvi.) found giant cells in granulation tissue of the middle ear and drum, which enclosed cholesterine crystals and exfoliated epidermis cells. In one case this author observed the giant cells lying inside of capillary vessels, which he recognized by their delicate walls and lining endothelium. This led him to suggest the probable origin of the giant cells from the endothelial cells. We have not been able to make similar observations, though the theory seems plausible.

As regards the etiology of pseudo-glioma, all of the hypotheses are at present mere assumptions. There is

quite a number of conditions that have been brought under the category of "pseudo-glioma," as *e. g.*, simple detachment of the retina, abscess of the vitreous produced by a foreign body, serous and suppurative choroiditis, and their sequelæ, etc. Of these, serous and suppurative choroiditis is most frequently confounded with true glioma. They occur after the infectious diseases, principally after cerebro-spinal meningitis, the exanthemata, tuberculosis, and inherited syphilis. The most natural supposition is that either the infectious germs of the constitutional disease are carried to the choroidal vessels, producing a local inflammation, or that chemical products of their growth are carried into the eye.

In our case there was nothing to attribute the infection to excepting the slight affection of the tonsils, contracted while nursing a scarlatinous patient a year ago.

Measles seem to lead to choroiditis rather frequently. It is a well-known fact that the eyes are always affected in measles, usually, however, only the conjunctiva and cornea. The deeper part may also be affected, but it seldom leads to blindness (P. Müller, *Augenerkrank. bei Masern*, Breslau, 1894). The deep inflammations, especially choroiditis, may run their course without any external signs of it. The same is true of inflammations in other parts of the body (pleura) after measles.

One of us (Dr. Cramer) recently observed a case of suppurative choroiditis, with detachment of the retina, following measles, which evidently was produced by an infectious embolus.

The child, six months old, with healthy eyes, was taken with an acute inflammation in the left eye during an attack of measles. Four weeks later the eye presented the typical "amaurotic cat's eye of Beer," *i. e.*, a discolored green iris, crater-shaped pupil, with total posterior synechia. The pupil was covered by a delicate exudation. Behind the lens the characteristic yellow exudation with apparently a smooth surface. The tension was normal. No marked phthisis of the globe.

The conjunctivitis of measles is no doubt produced by

the same bacteria which produces the primary trouble (Michel, Lehrbuch). In 1842 it was observed by Katona that, by inoculating a person with the conjunctival secretion of an individual affected with measles, a mild form of the disease could be produced. If the conjunctiva is so frequently affected in measles, we can conceive that the germs may just as easily be carried into the interior of the eye, and set up an inflammation there. We are justified, at any rate, in accepting this theory of the etiology of pseudo-glioma as long as we have no more plausible one. The correctness of the hypothesis can only be proven by getting for examination a fresh case of choroiditis after measles.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD QUARTER OF THE YEAR 1895.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. P. SILEX, in Berlin;

with the assistance of

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greeff, Berlin; Dr. Deus, Berlin; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

347. Snellen. Thirty-sixth annual report of the Netherland Eye Hospital in Utrecht for the year 1894.

348. Gunning. Twenty-second report of the Institution for Eye Patients in Amsterdam for 1894.

349. de Haas, G. M. Twenty-ninth annual report of the South Holland Eye Hospital in Rotterdam, 1894.

350. Newark Charitable Eye and Ear Infirmary. Fifteenth annual report, 1894.

351. Krüdener. My experience as an oculist in the town of

Krasnyj from June 1 to August 8, 1894. *St. Petersburger med. Wochenschr.*, No. 23, p. 204.

352. NIEDEN. Is the left or the right eye more in danger in miners? *Centralbl. f. prakt. Augenheilk.*, June, 1895.

353. WALTHER. Experiences of an itinerant cataract operator in the end of the nineteenth century. These ARCHIVES, xxiv., 4.

354. LANGE, OTTO. Diagrams for recording ophthalmoscopic conditions. Harold Bruhn, Brunswick, 1894.

355. SCHREIBER. Twelfth annual report of the Eye Institution in Magdeburg for 1894.

356. MEDEM, B. G. VON. Rules for the care and preservation of vision in pupils of army educational institutions. *Zeitschr. f. Schulgesundheitspflege*, viii., No. 8, p. 449.

In the Utrecht clinic SNELLEN (347) treated 4702 individuals as out-patients, and 547 as in-patients. There were 544 operations, 66 for cataract and 84 for strabismus.

In the Amsterdam Eye Hospital, GUNNING (348) treated 11,750 individuals as out-patients and 648 as in-patients. There were 271 operations, 25 for cataract and 99 for strabismus.

DE HAAS (349) treated 4905 individuals as out-patients and 256 as in-patients. Seventy-four operations were done for cataract and 81 for strabismus.

The number of new eye cases treated at the Newark Eye and Ear Infirmary (350) during the year 1894 was 3192. The number of operations, including the minor ones, was 548. The extractions were 6 simple, 15 combined. BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

357. KOSTER. Contributions to the study of tonometry and manometry of the eye. *Græfe's Arch.*, xli., 2, p. 113.

358. PERLES. Experimental studies on the infectious diseases of the eye. *Virchow's Arch.*, 140, p. 209.

359. BACH. Bacteriological investigations on the etiology of eczematous keratitis and conjunctivitis, with remarks on the classification, etiology, and prognosis of corneal ulcers. *Græfe's Arch.*, xli., 2, p. 159.

360. BACH. Bacteriological investigations on the influence of various dressings on the number of microbes on the lid margin and in the conjunctival sac. *Arch. f. Augenheilk.*, xxxi., p. 181.

361. HERRNHEISER. On the experimental production of embolism of the blood-vessels of the interior of the eye. *Zehender's klin. Monatbl.*, xxxiii., p. 315.

PERLES (358) inoculated the anterior chamber and vitreous with pure cultures of various bacilli. Friedländer's pneumobacillus proved to be particularly virulent, causing panophthalmitis and rupture of the ball in sixteen hours when injected into the vitreous. Fraenkel's pneumococcus has a similar but less virulent action. On the unbroken conjunctiva they had no effect. The suppurative process remained local. The virulent Fränkel-Weichselbaum pneumococci, however, soon caused death from general infection.

BACH (359) believes that the eczematous inflammations of the eye are caused by the staphylococcus pyogenes aureus, and inoculations with this coccus produced phlyctenulæ on the cornea and conjunctiva of human subjects and animals. The fact that the results of the bacteriological examination of the contents of phlyctenulæ are so often negative is due to the lateness of the examination. The prognosis of a central ulcer in the cornea is worse than that of a peripheric, since the former seems more likely to have associated with it severe inflammation of the iris and ciliary body.

III.—INSTRUMENTS AND REMEDIES.

362. SUKER, G. F. Gallicin, a gallic acid derivative; its use in the treatment of eye diseases. *Annals of Ophth. and Otol.*, July, 1895.

363. WEILAND. A new artificial eye of glass giving images of the same size as Helmholtz's schematic eye. *Ibid.*

364. MELLINGER. Gallicin, a new preparation of gallic acid, and its use in ophthalmology. *Correspondenzblatt für Schweitzer Aerzte*, No. 8, 1895.

SUKER (362) reports that he has had considerable experience in the use of the new derivative of gallic acid, gallicin, and has found it beneficial in catarrhal conjunctivitis and various forms of keratitis. It is in the form of powder, and used by insufflation.

BURNETT.

The advantages which WEILAND (363) claims for his artificial eye, which is constructed on the lines of Helmholtz's schematic eye, are that it gives images the same size as the average human eye, and gives a good idea of the small change in the length of

an eyeball necessary to produce axial ametropia. It can be used for demonstration in ophthalmoscopy, skiascopy, etc. BURNETT.

MELLINGER (364) has used gallicin, a methyl ether of gallic acid, similar to resorcin and pyrogallol, but non-poisonous, prepared by Sandor & Co., of Basle, on 200 patients. He recommends dusting the powder into the conjunctival sac, like calomel, once or twice daily. Its use is indicated in cases of catarrhal conjunctivitis with consecutive eczema and follicle formation, and of phlyctenular inflammation and superficial keratitis.

IV.—ANATOMY.

365. KOSTER. Contributions to the knowledge of the fovea centralis of the retina. *Geneeskundig Tydschrift*, 1895, vol. ii., p. 358.

366. KOSTER. Studies on the rods and cones of the macular region in the human eye. *Arch. d'opht.*, xv., No. 7, 1895.

KOSTER (365) found that the portion of the fovea which contains only cones is 0.5 *mm* in diameter, and the portion containing but a few rods 0.8 *mm*. The breadth of the cupping is greater. The breadth of an individual cone, according to Koster, is 4.5 μ, which agrees with Kölliker's figure.

V.—PHYSIOLOGY.

367. REDDINGIUS. On micropsia. *Inaug. Dissert.*, Groningen, 1895.

368. ANTONELLI. The sciascopic phenomena and the acquired myopia due to senile sclerosis of the lens, or to beginning cataract. *Rec. d'opht.*, 1895, p. 513.

369. STUELP. On the location and function of the different groups of cells in the oculo-motor nucleus. *Graefe's Arch.*, xli., 2, p. 1.

370. WEINLAND. New investigations on the function of the retina, with a theory of the active force in nerves in general. Tübingen, Franz Pietzcker, 1895.

371. FUCHS. On erythropsia. *Ophth. Rev.*, xiv., p. 241.

372. RUSSELL, J. S. R. The influence of the cerebrum and cerebellum on eye movements. *Ibid.*, p. 247.

373. BULL, G. Optometry by the subjective method. *Ibid.*, p. 275.

374. FIELD, A. G. Bright light in the school-room a cause of myopia, and a method proposed for the estimation of the quantity of light. *Jour. Amer. Med. Assoc.*, Sept. 21, 1895.

374a. LOWRY, J. B. The retinal images in oblique astigmatism. *Ophth. Rec.*, Aug., 1895.

Micropsia (367) after paresis of accommodation, due to the use of concave glasses or prisms, is due to the wrong estimation of distance. WESTHOFF.

According to ANTONELLI (368) the increase in the refractive index of the nucleus of the lens in sclerosis and incipient cataract can be recognized by a peculiar form of the pupillary shadow. When a plane mirror is used with weak illumination at a distance of 1 or 1.5 *m*, one sees a narrow, crescentic shadow appear with its convexity toward the pupillary margin, and separated from the pupillary margin by a luminous zone. This phenomenon is due to a considerable difference in refractive index between the centre and periphery of the lens.

By an analysis of 229 cases of oculomotor paralysis STUELP (369) has endeavored to answer the question, What is the location and function of the various groups of cells in the oculomotor nucleus? According to his conclusions the groups from before backward are arranged as follows: Accommodation, sphincter pupillæ and levator palp. sup., rectus internus and rectus superior, rectus inferior and obliq. inferior, and posterior to these the trochlearis. This is the scheme that most clinicians have accepted.

WEINLAND (370) in a long monograph has endeavored to offer a comprehensive theory of the functions of the retina, basing his assumptions on an anatomical foundation. The retina is supposed to have three functions, that of transforming light into another form of motion which can be conducted by a nerve, that of conducting this new motion toward the brain, and that of regulating the amount of light which is to be transformed into another form of motion.

The author accepts the existence of only one visual substance in the eye, which he locates in the pigment epithelium. The chemical changes in the visual substance cause changes of volume in the pigment cells and consequently variations of pressure on the cones, which is transmitted to the brain. These variations of pressure which are supposed to be particularly marked in the fovea act also upon the choroid and sclera, leading to increased length of the eyeball and ectasia of the coats, this being the pro-

cess in the development of school myopia. He also explains with equal plausibility, and at considerable length, the various phenomena of color perception.

FUCHS'S (371) paper was read at the British Medical Association meeting in July, 1895. In it he gives an account of erythropsia as studied in his own case, after exposure to snow. The condition was only produced at a certain height above the level of the sea, and never in the plain except with mydriasis. The method of procedure consisted in entering a dark room after exposure to snow light for two hours; the erythropsia takes a minute to fully develop and disappears in a minute or two more; the color is light purple and it is not found in the spectrum, but is complementary to the green at each side of the line F. which is seen as gray during the phase of erythropsia. Objects appear green at first. In the less intense cases the centre of the field is free; the red color extends 10° to 20° around the fixation point and is most marked in that part of the field which corresponds to the most dazzled part of the retina, *i. e.*, the lower portion of the field.

In aphakic eyes the erythropsia is the same in character but is stronger and of longer duration, and reaches closer to the periphery of the field—55° to temporal side in one case. The presence of the lens in the normal eye tends to protect the retina from dazzling, by rendering the light passing through it poorer in short-waved rays, and by its fluorescence transforms the short-waved rays into those of greater length. The author believes that erythropsia is due to the retinal purple becoming visible, and gives several reasons for this view. WERNER.

RUSSELL (372) finds that in the cerebral cortex of the cat and dog, lateral movements of the eyes are most powerfully represented, next the upward movement, and the downward least. If the external rectus of one eye and the internal rectus of the other be divided, stimulation of the cerebral hemisphere caused simple upward movement, and if the superior recti were then divided, simple downward movement only occurred. These centres probably only initiate movement by their action on lower centres, for when general convulsions were produced in an animal in which one "eye-area" was removed, no displacement of the eyes occurred. Ablation of one half of the cerebellum causes displacement of the eyes to the opposite side. In hemiplegia from a destructive cerebral lesion, the paresis of the limbs is on the opposite side, and the ocular displacement towards the same side

as the lesion, but in destructive cerebellar lesion, the limbs are affected on the same side as the lesion, while the eyes are turned to the opposite side. In a pontine lesion there is inability to turn the eyes away from the paresed limbs, while with a cerebellar lesion there is inability to turn the eyes towards the side whose limbs are paresed. WERNER.

BULL (373) alludes to the difficulty of determining the refraction, in cases of astigmatism, by the subjective method, owing to the accommodation, and points out that the range of accommodation in such cases may be divided into three zones, viz.: a *remote zone* in which one set of lines are visible; a *mean zone* in which both sets are seen with rapid and unconscious change of accommodation; and lastly a *near zone* in which only lines at right angles to those seen in the remote zone, are distinct. Astigmia, as he calls it, should in practice be examined in the remote zone, by using the weakest concave or strongest convex glass which renders one set of lines distinct, and then correcting the astigmia by concave cylinders in front of these. In an appendix some characteristics of astigmic vision are considered. In an object placed at the remote zone the lines at right angles to the least refractive meridian of the eye appear distinct; beyond this limit dispersion occurs and the lines become broader and fainter, the process of dissipation varying as follows: (*a*) Gradual increase of width and loss of intensity. (*b*) One edge of the line remains distinct, the other resolving into a penumbra. In some cases a reduplication or apparent doubling of the line takes place, sometimes three or four being visible. Of course multiple images may occur in spherical errors of refraction.

[This "doubling" of the image in astigmatism is a subject with which I have been familiar for some years, having first noticed it in my own case (0.5 D of astigmatism). The larger letters of Snellen's types appear to be overlapped by another letter of the same size, while of course in the smallest type the letters and the "phantom" are quite separate, the latter being situated above and the individual letters quite recognizable. Correction of the astigmatism removes it. This form of monocular diplopia can also be produced in eyes rendered astigmatic by a cylindrical lens.—L. W.] WERNER.

FIELD (374) suggests that too bright light is as injurious to the eyes as too dim light, and proposes as a measurer of the quantity of light the exposure of slips of albumen paper which has been sensitized by a standard solution of nitrate of silver 60 grains to

the ounce. The intensity of the brown color produced at a given exposure will measure quite accurately the intensity of the light.

BURNETT.

LOWRY (374a) attempts to show the position of the images on the retina in oblique astigmatism by means of pictures of a figure taken with a photographic camera rendered astigmatic by means of a cylindrical lens placed in front of the camera lens and turned at various angles. Copies of these photographs are reproduced.

BURNETT.

Sections VI.–XI. Reviewed by DR. HORSTMANN.

VI.—REFRACTION AND ACCOMMODATION.

375. AHLBORG. On the acuteness of vision in old age. *Inaug. Dissert.*, Berlin, 1895.

376. SCHNABEL and HERRNHEISER. On staphyloma posticum, conus, and myopia. *Zeitschr. f. Heilkunde*, 1895, vol. xvi.

377. GREEFF. On the value of the lens in myopia. *Zehender's klin. Monalsbl.*, xxxiii., p. 352.

378. PFLUEGER. The treatment of myopia of high degree by removal of the lens. *Corrs.-Bl. f. Schweizer Aerzte*, 1895, No 20, p. 642.

379. FABER. Operative treatment of astigmatism. *Geneeskundig Tydschrift*, 1895, ii., p. 495.

380. ALT. A contribution to the experiences in removing the lens in high-grade myopia. *Amer. Journ. of Ophth.*, 1895, No. 6, p. 165.

381. KATZ. The question of near glasses. *Wjest. Ophth.*, 1895, 4-5.

AHLBORG (375) examined 121 healthy eye in old individuals. In 42 eyes of individuals between 60 and 64 the average acuteness of vision was $\frac{6.27}{6}$; in 41 eyes of individuals between 64 and 69, $\frac{6.23}{6}$; in 21 eyes of individuals between 70 and 74, $\frac{6.11}{6}$; and in 15 individuals between 74 and 79, $\frac{4.73}{6}$.

According to the investigations of SCHNABEL and HERRNHEISER (376) in low and medium degrees of myopia, the axial length of the eyeball varies within the same limits as in emmetropic eyes. But in myopia above 10. D, the heighth and breadth of the eyes are also abnormally great, and the shape of the eyeball varies according to whether the enlargement of the portion of the ball posterior

to the attachment of the recti muscles is total or partial. Only a few of these eyes have a sharply circumscribed ectasia, but in all the resistance of the sclera is lessened. The conus is found with every degree of myopia and is rarely wanting in myopia and rarely present with other refractive conditions. The retina and pigment epithelium are wanting in the conus. All coni are congental [?—H.K.], and may later increase in size. In all myopic eyes the resistance of the sclera about the optic nerve is slight, and in this is the congenital disposition to myopia. The development of staphyloma posticum cannot be prevented, nor the transition of school myopia into myopia of high degree.

While in the emmetropic eye the optical value of the lens is about 10. D, GREEFF (377) has observed that in highly myopic eyes its value averages 15. D and may be as great as 22. D.

PFLUEGER (378) removed the lens from 36 highly myopic eyes in patients aged from 7 to 40. He performs discission of the lens and afterwards punctures the anterior chamber as soon as the lenticular masses are present there in quantity. The resulting difference in refraction varies between 14.5 and 20. D. In all cases the acuteness of vision for distance was increased and in many cases doubled or tripled. He has not had detachment of the retina. Choroiditis that has run its course and maculæ corneæ are not contra-indications.

In a patient of 19 with myopic astigmatism and corrected vision $\frac{4}{5}$, FABER (379) made an incision at the sclero-corneal margin for the purpose of flattening the cornea and obtained a corrected vision of $\frac{5}{6}$ the astigmatism being reduced from 1.5 D to 0.75 D.

In ALT's (380) case there was M. of 20 D.; with slight dislocation of both lenses downward. With correction V in R = $\frac{1.6}{200}$ L $\frac{6}{200}$. The right lens was needled twice and without a glass V = $\frac{20}{200}$, No. 1 at 10 inches with + 2.75. D. The left was then needled but after the absorption of the lens it was found that there was a detachment of the retina at the outer half. As there was evidence of choroiditis in both, Alt ascribes the differences in the results to an adhesive inflammation in the right which did not exist in the left. BURNETT.

KATZ (381) analyzed 407 cases of presbyopia seen in the St. Petersburg clinics and arranged a scale of glasses corresponding to ages which differs both from that of Donders and that of Landolt. For 40 years, a glass of 0.75 D; for 45, 1.5 D; for 50, 2. D; for 55, 2.5 D; for 60, 3. D; for 65, 3.25 D; for 70, 3.5 D. [These values on an average appear too high—H. K.]

VII.—LIDS.

382. BRANDT. On the bacteria of the lid margin and conjunctival sac, and the effect on them of various dressings and salves. *Verhandl. d. physiol.-med. Gesellsch. zu Würzburg*, xxix., No. 5.

383. SCOTT, KENNETH. The radical operative treatment of trichiasis. *Ophth. Rev.*, xiv., p. 296.

384. HOTZ. The reconstruction of the lid border in entropion of the upper lid. *Annals of Ophth. and Otol.*, July, 1895.

385. KEIPER. Tetanus following wound of lower lid. *Annals of Ophth. and Otol.*, July, 1895.

BRANDT (382) gives a list of the micro-organisms found on the lid margin and in the conjunctival sac, and speaks of the influence of antiseptic dressings on the number of micro-organisms present, which he finds to be very slight.

SCOTT (383) includes entropion under the term trichiasis. His operation consists in a "tarsal reposition"; the tarsus is divided in its whole length parallel to the lid margin, and from the conjunctival surface, the portion including the cilia is forcibly everted, and retained in position by silver wire sutures, which reach up to the eyebrow. WERNER.

HOTZ (384) uses a skin flap somewhat thicker than the Thiersch graft to fill in the gap after the bridge of skin containing the cilia has been attached by three sutures to the upper edge of the tarsus, according to the method devised by him some years ago. This graft he takes from the smooth skin behind the ear, and fits it into the exposed space without suture. In twenty-four hours it has united, but it sheds its epithelium three or four times before it becomes thoroughly adapted to its new position.

BURNETT.

KEIPER (385) reports a case of a boy of fifteen, who died of tetanus following a penetrating wound of the lower lid, about 2 lines from its centre and a half inch long, caused by a stiff weed.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

386. REHR. On the etiology and therapy of dacryocystitis. *Inaug. Dissert.*, Kiel, 1895.

387. STORY, J. B. Which canaliculus to slit in probing the nasal duct. *Ophth. Rev.*, xiv., p. 161.

388. Roy, Dunbar. Congenital fistulæ of the lachrymal sac. *Amer. Journ. of Ophth*, June, 1895.

Rehr (386) records 186 cases of extirpation of the sac done since 1889 in the Kiel clinic for dacryocystitis, with uniform good results.

Story (387) finds the results far better and more easily attained by division of the upper punctum instead of the lower.

Werner.

In the case reported by Roy (388), a colored girl of fourteen years was suffering from conjunctivitis, and it was incidentally noticed that there was a fistula from each of the lachrymal sacs. There was no history of dacryocystitis, and the discharge from the openings was purely lachrymal. The openings admitted a Bowman No. 1 freely. Her mother stated that she had noticed this discharge of tears from the sides of her nose ever since she was born. Burnett.

IX.—MUSCLES AND NERVES.

389. Bourgeois. Operative treatment of strabismus. *Rec. d'opht.*, 1895, No. 8, p. 470. (Recommends muscular advancement as preferable to capsular advancement.)

390. Greeff. Remarks on the binocular vision of patients with squint. *Zehender's klin. Monatsbl.*, xxxiii., p. 352.

391. Boskamp. A case of bilateral ophthalmoplegia with a peculiar course. *Inaug. Dissert.*, Bonn, 1895.

392. Chauvel. Ophthalmological studies. *Rec. d'opht.*, 1895, p. 391.

393. Doehne. On horizontal and rotatory nystagmus artificially produced in normal individuals and deaf-mutes. *Inaug. Dissert.*, Würzburg, 1895.

394. MacGillivray. Hereditary congentital nystagmus associated with head movements. *Ophth. Rev.*, xiv., p. 252.

395. Fergus, Freeland. An operation for the advancement of a rectus muscle. *Ibid.*, p. 163.

396. Alt. Paresis of the oculomotor nerve in combination with acute pneumonia. *Amer. Journ. of Ophth.*, June, 1895.

Greeff (390) reports on patients that had stereoscopic vision after a squint operation, and even performed correctly Hering's test with the falling balls.

MacGillivray (394) describes 8 cases of lateral nystagmus

with head movements in 4 generations of one family, the males being mostly affected, through the females. One generation escaped. Vision was defective, with more or less astigmatism in those cases which were examined. No syphilis, nervous disease, or consanguinity. The father of the first generation was a coal-miner. In another family 4 cases are described, 3 being boys. The father was alcoholic. Amblyopia and astigmatism also present in these cases. WERNER.

FERGUS (395) makes two incisions parallel to the border of the muscle, and passes two sutures through muscle and conjunctiva near the canthus, in the usual way; these are tied on the muscle and conjunctiva, and the latter are divided at the insertion of the muscle, a portion of the flap being removed if necessary. The sutures are passed through the tendinous insertion before being brought through the conjunctiva above and below the cornea. WERNER.

In ALT'S (396) case a woman had paresis of all the branches of the oculomotor nerve of the right side without apparent cause. Some days afterwards she was seized with pneumonia, and Alt thinks the paresis due to the pneumonia toxine acting first on the oculomotor centre. BURNETT.

X—ORBIT AND NEIGHBORING CAVITIES.

397. GASPARRINI. Suppurative tenonitis due to the pneumo-coccus. *Annal. di Ottalm.*, xxiii., 6, p. 453.

398. BLESSIG. A case of gummous disease of the orbit, the middle fossa, and the brain. *Zehender's klin. Monatsbl.*, xxxiii., p. 325.

399. VALUDE. Cystic angioma of the orbit; electrolysis. *Annal. d'ocul.*, cxiv., p. 210.

400. PANAS. Malignant pseudo-plasms of the orbit. *Arch. d'opht.*, xv., No. 9.

401. LAGRANGE. Congenital embryonic tumor in the orbit, composed of both nervous and connective tissue. *Arch. d'opht.* xv., 9, p. 536.

402. VILLARD. A contribution to the study of the suppurations of the eye and the orbit consecutive to affections of the neighboring cavities. *Arch. d'opht.*, xv., 8, p. 477.

403. COPPEZ. Orbital tumor with secondary involvement of the sclera and cornea. *Ibid.*, xv., 9, p. 544.

404. GUSSENBAUER. Temporary resection of the nasal framework in order to expose the frontal, ethmoidal, and orbital cavities. *Wiener klin. Wochenschr.*, 1895, No. 21.

405. FRANKE, ANTON. Report of a case of pulsating exophthalmus. *Prager med. Wochenschr.*, 1895, No. 39.

406. FRIDENBERG, PERCY. A case of exophthalmic goitre with monocular symptoms and unilateral thyroid hypertrophy. *Med. Record*, July 13, 1895.

407. JENNING. Congenital rhabdo-myoma of the orbit. *Amer. Journ. of Ophth.*, July, 1895.

GASPARRINI (397) describes as a previously unknown suppurative tenonitis a severe inflammation of the eyeball with œdema of the lids and conjunctiva, fever, pain on pressure, and perforation of the conjunctiva of the lower lid by a purulent mass. With the sound the fistula could be followed nearly to the ball at the point of attachment of the inferior muscles. Cultures and inoculations demonstrated that the pyogenous element was Fraenkel's diplococcus, which had probably passed in through a small marginal ulcer of the cornea that existed at the beginning of the disease. The patient had suffered also from abscess of the tear sac and had lupus nodules on the face. Nevertheless Koch's bacilli could not be found. The function of the eye and the fundus were normal throughout the course of the disease, which would rule out orbital abscess. DANTONE.

BLESSIG (398) made an exenteration of the orbit in a man of thirty-one with an orbital tumor, which proved to be a gumma. Soon after there was choked disc in the second eye with other symptoms of brain tumor and the patient died. At the autopsy there was found a gummous mass which filled the sella turcica, surrounded the ophthalmic artery and the right half of the chiasm, extending into the anterior portion of the temporal bone and involving the lower surface of the temporal lobe of the brain.

In a case of angioma of the orbit, VALUDE (399) caused the exophthalmus to disappear by the employment, on two occasions, of negative electrolysis (4½ milliampères continued for 5 minutes). The exophthalmus had existed for years, gradually increasing, and the existence of the tumor was confirmed by means of an exploratory incision along the roof of the orbit. The vision of the eye is now ½. SULZER.

PANAS (400) believes that many orbital neoplasms thought to be lymphomata, sarcomata, and syphilomata are to be regarded as

infectious tumors due to microbes or to a dyscrasia produced by toxines. Syphilis is one of these dyscrasias but not the only one. Panas grounds his views on a number of observations, some personal, some in literature, like the following: A bilateral exophthalmus apparently due to orbital sarcoma in a man with ozæna but no syphilis, and cured completely by arsenic.

A young woman, non-syphilitic, who, after removal of sarcomatous poylpi from the left nose, suffered from left exophthalmus caused by indurated cellular tissue in the orbit. This tumor, like the polypi, was not sarcomatous. Marked improvement followed the use of arsenic. A symmetrical tumor of both superior maxillæ in a boy of fifteen was cured by the same remedy.

In cases apparently of sarcoma of the orbit, preliminary treatment with iodine, arsenic, or toxines should be instituted. The discovery of the point of origin of the infection—the nose and neighboring cavities and the pharynx—and the bacteriological determination of the toxines give an indication for the diagnosis and therapy. Surgical treatment, which is often inefficacious, stands in the second place. v. MITTELSTÄDT.

LAGRANGE (401) records a rare case of congenital tumor of the right orbit in a patient of twenty, of healthy antecedents. The tumor filled the entire orbit and projected from it. The ball, at first intact, was not covered by the lids. The extirpation of the growing tumor with the thermo-cautery was well borne at first, but fever came on and death followed. The autopsy showed that the tumor had invaded the cranial cavity and the maxillary antrum. Excepting a purulent keratitis the eyeball was healthy and also the optic nerve. The tumor contained many young blood-vessels in its periphery and consisted of embryonic connective-tissue cells, and of embryonic nerve cells with scanty protoplasm and a large nucleus. It belonged in the category of gliomata, but differed materially from retinal glioma. v. MITTELSTÄDT.

VILLARD (462) reports a case of thrombo-phlebitis of both orbits coming on in a healthy child aged three years, four days after the appearance of two small furuncles on the right side of the nose. The eyeballs were not affected but abscesses formed in the lids, the pus containing streptococci, and pustules and large abscesses developed elsewhere in the body, and death from pyæmia resulted four weeks after the inception of the disease. Meningeal signs were wanting.

Villard reports also a case of circumscribed phlegmon of the orbit developing after an angina in a girl of thirteen, with a tuber-

culous parent. After puncture and evacuation of the pus, which did not contain tubercle bacilli, the bone was exposed and an inflammation of the optic nerve and internal rectus came on, followed by strabismus divergens, which was corrected by a double tenotomy, and the inflammation was cured by drainage. The angina was thought to be the cause of the phlegmon.

He refers also to two other cases with metastatic inflammation in the eye and general septicæmia after angina. v. MITTELSTÄDT.

In COPPEZ's (403) patient, a previously healthy girl of eight, a tumor appeared under the upper orbital margin particularly to the nasal side. There was ptosis, almost complete immobility of the eye, but no exophthalmus. The cornea was infiltrated and there was a deposit obscuring the sclero-corneal margin.

After removal of all the contents of the orbit the general condition seemed to improve, but the child soon became anæmic and fever and convulsions came on, followed by death. There was a diffuse infiltration of the contents of the orbit including the eyeball, with round cells, and the case was thought to be one of malignant lymphoma, similar to one reported by Gayet.

v. MITTELSTÄDT.

For the purpose of removing retro-bulbar tumors, GUSSENBAUER (404) twice resected the nose. In one case a recurrent sarcoma of the left orbit that had been removed three times finally passed through the ethmoid sinus into the frontal sinus and thence into the right orbit.

The second case was one of endothelioma psammosum that, arising in the left orbit, grew into the ethmoid and sphenoid bones and perforated the skull. Both operations were followed by satisfactory results.

In FRANKE's (405) case a man sprang head first into the water from a height of six feet and noticed immediately a tinnitus, followed three weeks later by a marked exophthalmus. Digital compression had no effect, so the common carotid was ligated, when the symptoms disappeared, but returned again six weeks later. HERRNHEISER.

The patient, whose history FRIDENBERG (406) records, was a woman of twenty-four years who had all the classical symptoms of Graves's disease. The peculiar features of the case are the limitation of the eye symptoms to the left eye with right or "crossed" hypertrophy of the thyroid. He gives a synopsis of the histories of twelve other cases of unilateral exophthalmic goitre. BURNETT.

In the case reported by JENNING (407), a child of fourteen months had a tumor in the lower inner quadrant of the orbit which pushed the ball upward, outward, and forward. The tumor had been first observed six weeks before, and had been getting larger. It was loosely attached to the surrounding tissue except at the apex which seemed rather firmly adherent to the ethmoid. It measured an inch in length and $\frac{1}{4}$ inch in breadth. On section it was found to be composed of connective tissue with an abundance of striated muscular fibres, the whole structure resembling a rhabdo-myoma.

BURNETT.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

408. KELLGREN. On the mechanical and operative treatment of trachoma. *Serafimer Lasarettets eye clinic.* Report for 1894. Stockholm, 1895, p. 568.

409. GUNNING. The contagiousness of trachoma. *Genessk. Tydschr.*, 1895, vol. ii., p. 232.

410. VAN MILLINGEN. Statistics of trachoma. *Annal. d'ocul.*, cxiv., p. 171.

411. PROKOPENKOFF. On the treatment of chronic forms of trachoma. *Ibid.*, No. 38.

412. LEHMANN. On the operative treatment of granular conjunctivitis with special deference to the tarsus. *Inaug. Dissert.*, Königsberg, 1895.

413. STEINER. A case of pigment-adenoma of the conjunctiva. *Centralbl f. prakt. Augenheilk.*, 1895, p. 296.

414. ROGMAN. A contribution to the study of simple serous cysts of the conjunctiva. *Arch. d'opht.*, xv., No. 8, p. 502.

415. EWETZKY. Scleroma of the conjunctiva. *Wratsch.*, 1895, Nos. 32–33.

KELGREN (408) has used Knapp's trachoma forceps with good results. He considers the operation indicated in all the cases of trachomatous infiltration, excepting the acute cases with intense hyperæmia, marked swelling, and excessive secretion. Complicating corneal processes are not a contra-indication, but they are, on the contrary, usually favorably affected by the operation.

Differing with most ophthalmologists, GUNNING (409) believes that trachoma is not contagious. There is no mucous or purulent secretion. It is always chronic, acute trachoma being nothing but

a complication with acute catarrh or acute blennorrhœa. The continued irritation by the air of overcrowded rooms may be a cause of trachoma, or may, at least, predispose to it. That trachoma is due to infection is disproved by the fact of it often being confined to one eye, by the fact of husband and wife not infecting each other, and by the fact that inoculation with the mucopurulent secretion of trachomatous lids produces, as a rule, a catarrh but not trachoma. Therefore, the isolation of trachoma patients is not necessary, but all persons with a mucous or purulent discharge should be isolated whether they have trachoma or not. WESTHOFF.

VAN MILLINGEN (410), after extended researches, has attempted to give general statistics of trachoma. His conclusions differ with the views of many whose observations of trachoma are confined to a single locality. He believes: 1. That trachoma is an infectious and contagious disease, which is more frequent in uncivilized lands, and tends to disappear as civilization advances. Hygienic observances and cleanliness are the best preventives of trachoma. 2. The height above the sea level does not affect the frequency of trachoma, which spreads wherever there is filth and poverty. 3. All nationalities are equally susceptible to trachoma, and there is not an immunity for certain races. SULZER.

PROKOPENKOFF (411) prefers the sulphate of copper stick in cases of old, partially cicatricial trachoma, complicated with pannus. He recommends touching the conjunctiva in its entire extent with the stick, using some pressure. He also massages the conjunctiva, and even the cornea when there is pannus, with a smooth glass rod. This increases the reaction and shortens the duration of treatment. HIRSCHMAN.

STEINER (413) removed a fungus-shaped tumor from the conjunctiva of the upper lid of a Malay in the region of the tarsus. The tumor had a diameter of from 4 to 7 *mm*, and proved to be a pigmented adenoma.

The cysts described by ROGMAN (414) are small vesicles movable under the conjunctiva, which, as their structure shows, do not originate from lymph vessels. The wall consists of a thin homogeneous layer of elastic tissue lined with a multiple layer of epithelial cells. The author believes that these cysts arise from the indipping of the surface of the conjunctiva and the later obliteration of the stalk. v. MITTELSTÄDT.

In studying two cases of thickening of the upper lid in which a probable diagnosis of amyloid degeneration had been made,

EWETZKY (415) found in excised bits the changes which are characteristic of scleroma, and in both cases he found the characteristic bacilli. In both cases there was a marked development of fibrillar connnective tissue having epithelioid cells which had undergone hyalin degeneration among its bundles. There was no trachoma present. HIRSCHMANN.

416. SANTARNECCHI. Hydraulic curetting of the cornea. *Annal. d'ocul.*, cxiv., p. 193.

417. WENDT. Clinical and experimental studies on striped opacity of the cornea in purulent keratitis. *Inaug. Dissert.*, Greifswald, 1895.

418. TROUSSEAU. Interstitial keratitis in acquired syphilis. *Annal. d'ocul.*, cxiv., p. 206.

419 BACH. Remarks on tuberculosis of the eye. *Munch. med. Wochenschr.*, 1895, No. 18.

420. ZIEM. Keratomycosis (incipient keratomalacia) in an infant with congenital hemorrhagic syphilis. *Wiener klin. Wochenschr.*, 1895, Nos. 34–35.

421. MAGER. A case of developmental anomaly in both eyes. *Ibid.*, No. 14. (Peculiar corneal opacity and occlusion of the pupils.)

SANTARNECCHI (416) recommends in cases of acute ulceration of the cornea a process that in simplicity leaves nothing to be desired. He directs a stream of 1:1000 bichloride solution from an Anel's syringe against the ulcer until the purulently infiltrated tissue is washed away. SULZER.

WENDT (417) speaks of the striped opacity of the cornea in purulent keratitis as he has observed it in man in seven cases, and a number of times in experimental studies on rabbits. He considers it, as do Hess and Müller, as due to a folding of Descemet's membrane. When the ulcer has reached a considerable depth, the intra-ocular pressure forces Descemet's membrane forward in the region of the ulcer, producing folds in the membrane, radiating from this point.

Taking into consideration the literature and eleven observations of his own, TROUSSEAU (418) has endeavored to give the clinical picture of interstitial keratitis with acquired syphilis. Women are more frequently affected than men, and the disease is mostly unilateral, and recurrences are rare. The corneal affection appears between the first and third years after infection. The cases are completely and quickly cured when mercury is used. SULZER.

Sections XII.–XXI. Reviewed by Dr. P. SILEX.

XII.—IRIS.

422. Ahlström. Contributions to the pathogenesis of iritis. Deutschmann's *Beiträge z. Augenh.*, xxi.

423. Bouvin. Traumatic aniridia and aphakia. *Gen. Tydschr.*, 1895, ii., p. 231.

424. Schanz. Three cases of unilateral reflex iridoplegia. *Arch. f. Augenheilk*, xxxi., 3, p. 258.

425. Reber, Wendell. The pupil in health and epilepsy. *Med. News*, Aug. 24, 1895.

426. Felten. On inequality of the pupils in patients without nervous or ocular affections. *Inaug. Dissert.*, Bonn, 1895.

Ahlström (422) has endeavored to find a connection between particular inflammations of the eye and general diseases. With this intention he twice placed bits of the iris of rheumatic individuals who had suffered from iritis into the anterior chamber of rabbits; in both iritis developed but no microbes were found. Aqueous humor aspirated from the anterior chamber and injected into another eye also caused iritis. Bits of healthy iris, however, caused no inflammation. He explains these facts by supposing that there are toxic substances circulating in the bodies of rheumatic patients which are irritating to the uveal tract, the joints, etc. These substances remain in the excised bits and cause the inflammation in the inoculated eye.

Bouvin's (423) patient had struck the left eye with a door-latch, which had produced a lacerated wound of the sclera 2 *mm* from the corneal margin. Hyphæma, T–3. Rest and a pressure bandage brought about recovery, but no trace of lens or iris could be found. Westhoff.

Schanz (424) records 3 cases of reflex iridoplegia which he explains according to Heddæus's scheme. The iris branch of the third nerve is composed of two roots, one from the sphincter nucleus and one from the accommodation nucleus. Destruction of the sphincter nucleus, or the root arising from it, leads to unilateral reflex iridoplegia; when the accommodation nucleus is also involved, there is complete iridoplegia.

From an examination of a number of normal persons (50), and of those affected with epilepsy (22), Reber (425) arrives at the conclusion that pupillary inequality, even of considerable degree,

is not always pathologic; that in health the latent is more frequent than the manifest form; that in epilepsy the latent form is even more frequent (2 to 1); that in order to demonstrate latent inequality the influence of the oculomotor must be set aside as nearly as possible. BURNETT.

FELTEN (426) kept under observation for several weeks 61 patients in the medical clinic at Bonn that were not suffering from nervous or ocular diseases, and in 28 of these he found a difference in the size of the pupils. In 6 cases this was constant, in 2 varying, and in 20 transitory; 13 suffered from diseases of the respiratory tract, 2 of the circulatory apparatus, 6 of the alimentary tract, the others from carcinoma, etc. In many of the cases irritation or paralysis of the sympathetic would account for the inequality; in others no explanation could be given. On the whole the author concludes that pupillary difference has no significance.

XIII.—CHOROID.

427. PARISOTTI. On a rare intra-bulbar tumor (endothelial sarcoma). *Annal. d'ocul.*, cxiii., 128.

428. DE SCHWEINITZ. On certain bacilli found in a case of post-operative panophthalmitis. *Ibid.*, cxiv., p. 55.

429. COPPEZ H. A case of suppurative irido-choroiditis which recovered with complete restoration of acuteness of vision. *Rev. génér. d'opht.*, xiv., p. 385.

430. EWETZKI and BERESKEW. On bacillus panophthalmitis. *Medicins Koje Obosrenije*, 1895, No. 10.

431. SCHIÖTZ. Ossification of the choroid. *Norsk Mag. f. Lagerid.*, Christiania, 1895.

432. GRIFFITH, JOHN. Choroidal sarcoma in infancy. *Ophth. Rev.*, xiv., p. 286.

PARISOTTI (427) observed a case of endothelioma of the eyeball in a man of twenty-six, the clinical symptoms being those of a rapidly growing sarcoma of the choroid. The patient died a year after enucleation, with symptoms of cerebral tumor. The tumor mass formed a shell adherent externally to the sclera and occupying the posterior segment of the ball. Microscopically the tumor was limited internally by pigment, externally by the sclera, and was composed of a network of connective-tissue fibres in the meshes of which were endothelial cells. SULZER.

By means of sublimate injections and general antiphlogistic

treatment COPPEZ (426) succeeded in curing a severe case of panophthalmitis with chemosis, hypopyon, purulent exudation in the pupil, and increased tension. SULZER.

In the case reported by EWETZKI and BERESKEW (430) symptoms of inflammation came on three days after extraction, and the wound began to gape, the iris prolapsed, the anterior chamber became filled with white masses which proved to be fibrin enclosing numbers of capsule bacilli similar to the bacillus salivarius septicus (BIONDI). These bacilli produced death when injected into animals, and caused an inflammation similar to that observed in the enucleated eye when inoculated into the anterior chamber. This bacillus, which caused an inflammation characterized by the presence of a tough white fibrinous exudation into the anterior chamber, preservation of the cornea, and the absence of pus, was also found in the saliva and in the secretion of the lachrymal sac. HIRSCHMANN.

GRIFFITH (432) is inclined to believe that many tumors at present considered gliomata, are really sarcomata of the choroid. He records two cases of sarcoma originating in the choroid in infants. Glioma of the retina, so called, he believes to be a small round-celled angio-sarcoma originating in the sustentacular framework of the retina, differing very much from glio-sarcoma of the brain. As the choroid of infants is poor in pigment, sarcomata occurring at that age are non-pigmented. Retinal growths are composed of small round cells, are liable to secondary degenerations, and show irregular staining of the cells; whereas those of the choroid present larger cells, are less prone to degeneration, and tend to rapidly infiltrate all the intraocular tissues. WERNER.

XIV.—GLAUCOMA.

433. FABER. Acute glaucoma cured without operation. *Geneeskundig Tydschrift*, 1895, p. 521. (Instillation of pilocarpine.)

434. ELSCHNIG. Glaucoma after cataract extraction. *Zehender's klin. Monatsbl.*, xxxiii p. 233.

435. ELSCHNIG. Remarks on glaucomatous excavation. *Arch. f. Augenheilk.*, xxxi., p. 312.

ELSCHING (434) reports on the case of a woman in whom glaucoma developed in each eye after a normal cataract extraction, without any cause for it being found. Cataract operation, like other insults, emotions, etc., may bring on glaucoma in eyes that are predisposed to it.

XV.—SYMPATHETIC OPHTHALMIA.

436. ROGMAN. On the curability of sympathetic uveitis. *Ann. d'ocul.*, cxiv., p. 8.

437. BOURGEOIS. A note serving for the history of sympathetic ophthalmia. *Rec. d'opht.*, 1895, p. 397.

On the ground of personal observations and reports in the literature of cured cases of sympathetic irido-cyclitis, ROGMAN (436) states that the prognosis of this affection is not so hopeless as the text-books say. SULZER.

BOURGEOIS (437) subjected 12 eyes, enucleated for having caused sympathetic ophthalmia, to a careful bacteriological examination. With a single exception (staphylococcus aureus), the tissues of the enucleated eyes were found to be completely sterile.

XVI.—LENS.

438. LIEBRECHT. On isolated injuries of the lens capsule. A case of large isolated rupture healing without causing cataract. Deutschmann's *Beiträge zur Augenheilk.*, 1895, pt. 18.

439. SACHSALBER. Hyalin excrescences of the anterior capsule of the lens. *Ibid.*

440. KAYSER. On simple extraction with a table of operations done in 1891–1894 in the Royal Serafimer Laserettet for senile cataract. *Hygiea*, Stockholm, 1895.

441. WIDMARK. On the use of cocaine and disinfection of the eye in cataract operations. *Ibid*, No 9.

442. DE SPÉVILLE. A rare complication after extraction. *Ann. d' ocul.*, cxiv., p. 215. (Failure of closure of the corneal wound for three months, an attack of glaucoma cured by iridectomy, which also brought about closure of the corneal wound.)

443. LESSING. Lamellar cataract and operations. *Inaug. Dissert.*, Berlin, 1895.

444. ELSBERG. On the operation for secondary cataract. *Zehender's klin. Monatsbl.*, xxxiii., p. 249.

445. SCHNEIDEMANN. Note upon condition of the pupil following extraction of cataract. *Ophth. Rev.*, xiv., p. 209.

446. BETTMAN, BOERNE. Simple cataract extraction and some thoughts on prolapse of the iris. *Chicago Med. Recorder*, Aug., 1895.

447. WEEKS. A report of one hundred consecutive cases of cataract extraction. *N. Y. Med. Journ.*, Aug. 3, 1895.

448. BURNETT, S. M. Some exceptional features in cataract extraction. *Virginia Med. Monthly*, July, 1895.

In SACHSALBER'S (439) patient, a man of sixty, with detachment of the retina, there were a number of elevations 0.5 *mm* high, of bluish-white color, mostly round, and arranged in groups on the posterior surface of the anterior capsule of the lens.

KAYSER (440) reviews the history of simple extraction with its advantages and disadvantages, compares the published results of simple and combined extraction, and adds the results of the operations done in the Serafimer Hospital. He concludes that the extraction without iridectomy gives better vision and fewer failures, and does not necessitate a secondary discission oftener than the extraction with iridectomy. SCHIÖTZ.

WIDMARK (441) speaks of the cloudiness of the cornea that follows the use of cocaine and bichloride, and reviews the literature of the subject and the experimental investigations on the disinfection of the eye. In conclusion he gives a résumé of the results of extraction in the Stockholm hospital in the years 1859–95, there being in the pre-antiseptic period 14.8 per cent. of failures, and in latter years 1.24 per cent. Before the operation Widmark washes out the eye with bichloride 1:5000, and immediately after uses sterilized physiological salt solution. SCHIÖTZ.

LESSING (443) reports on the operations done in the Berlin eye clinic, and states that for years Schweigger prefers removal of zonular cataract to iridectomy.

ELSBERG (444) recommends that all secondary cataracts requiring operation be cut through with the small scissor-forceps that he has had made by Wülfing-Luer, in Paris.

SCHNEIDEMANN (445) thinks he has observed that the upper portion of the pupil is always the clearest part, after an extraction, and he recommends dividing the capsule with the cystotome horizontally, below the level of the pupil, and following up with a vertical incision beginning above with a Græfe's or Knapp's knife. WERNER.

BETTMAN (446) gives the results of his recent experience in cataract extraction by the simple method, relating the histories of 11 cases in detail. He considers that the employment of eserine, atropine, or cocaine does not affect in any way the occurrence of prolapsed iris. The most important factor of good results he considers to be the after-treatment, the observance of methods

which will counteract intra-ocular tension and lead to rapid union of the wound. BURNETT.

WEEKS (447) gives a carefully tabulated history of 100 cases of cataract extraction, all done without iridectomy. In 20 cases the cataract was complicated in some manner. In 80 it was uncomplicated. In the latter there was but one entire failure, the others ranging from $\frac{10}{200}$ to $\frac{20}{20}$ of vision. The writer makes frequent discissions of the capsule—about 80 % in his private cases. The mean vision noted before discission was $\frac{20}{80}$; after discission, $\frac{20}{30}$. The primary incision is made in the limbus, and occupies two fifths of the corneal circumference; and the operation is done in the bed in which the patient is to lie. Peripheral capsulotomy is usually performed. Prolapse of iris occurred in 2 cases, and adhesion of iris to wound without prolapse in two others.

BURNETT.

BURNETT (448) reports three cases of extraction of the lens in its capsule through an intact pupil without the loss of any vitreous, and thinks this should be attempted in most cases of degenerated lenses, and particularly where there is reason to suspect a weak or ruptured zonula. He also reports a case of destructive panophthalmitis in an eye, which began three weeks after the extraction and more than a week after the eye had become clear.

XVII.—VITREOUS.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

449. TSCHEMOLOSSOW. Blood extravasations in the retina in Biermann's pernicious anæmia from tape-worm. *St. Peterburger med. Wochenschr.*, No. 50, 1894.

450. HEINZEL. Further cases of amblyopia in the period of lactation. Deutschmann's *Beiträge z. Augenh.*, xxi.

451. CERILLO. Amblyopia from the use of stramonium. *Rec. d'opht.*, 1895, p. 403.

452. KRIENES. On hemeralopia, particularly acute idiopathic hemeralopia. Bergmann, Wiesbaden, 1895.

453. KÖNIG. Transitory hemianopsia and concentric contraction of the visual field in a case of cerebral paralysis in a child. *Arch. f. Psych. u. Nervenkrankheiten*, 1895, p. 936.

454. KLITSCH. On hysterical monocular polyopia, with a glance at the hysterical ocular disturbances. *Inaug. Dissert.*, Leipsic, 1895.

455. Voges. Fatigue of the visual field; new experiments, with a critical analysis of the literature. Prize essay. Göttingen, 1895.

456. Culbertson. Report of a case of mind-blindness, with auto-word blindness. *Amer. Jour. of Oph.*, July, 1895.

457. Boteler. Glioma; operation, cautery; recovery. *Med. Record*, Aug. 31, 1895.

458. De Schweinitz. Remarks on the field of vision in certain cases of "neglected eyes." *Annals of Oph. and Otol.*, July, 1895.

459. Booth, J. A. Hysterical amblyopia and amaurosis. Report of five cases treated by hypnotism. *Med. Record*, Aug. 24, 1895.

Tschemolossow (449) saw extravasations of blood in the retina of four individuals with botriocephalus latus. The extravasations were of various sizes, and were absorbed in about ten days. These extravasations arise in the way of diapedesis, and are characteristic of pernicious anœmia in general, and not of the presence of any particular sort of parasite.

Heinzel (450) records three more cases of amblyopia in the period of lactation. Any degree of visual disturbance may exist. There is usually a partial atrophy of the nerve. In two cases of retro-bulbar neuritis normal vision was obtained by tonic treatment after weaning the infant.

An asthmatic patient of Cerillo's, (451) who had smoked stramonium cigarettes for four years, had subjective symptoms resembling those of tobacco. Abstention from the use of the drug led to complete recovery in two months. Sulzer.

Krienes (452) has attempted in his book to explain acute hemeralopia, both as to its symptomatology and as to its etiology, taking into account the literature and cases under his own observation. The mystery of the affection is explained by "a disturbance in equilibrium between the consumption and regeneration of the visual substance." To the symptoms of retinal torpor revealed by Förster's photometer that are well known he adds another—the decreased perception of blue both in the centre and in the periphery.

Voges (455), after a critical review of what has been said on the subject, comes to the conclusion that an insufficient attention is responsible for the development of symptoms of fatigue of the visual field, and since these symptoms come on in healthy individuals they can have no significance.

In CULBERTSON'S (456) patient, a man of sixty-seven years, there were several attacks of temporary want of recognition of familiar objects. There followed what was called nervous prostration, then cerebral softening, ending in insanity and death. During the latter part of his illness he had a peculiar form of alalia. He would write a sentence and in it there would be words foreign to the subject of which he was writing. These words were spelled correctly, but he was not aware that he had used the wrong words. He could read the letters of others either written or printed, and understand them perfectly when he read them either aloud or to himself. There was no autopsy.

BURNETT.

BOTELER'S (457) patient was a child of three and a half years in whom something peculiar had been noticed about its eyes since birth. When seen glioma in the third stage was diagnosticated. There was much swelling of the ball, with some ulceration at the sclero-corneal margin and considerable exophthalmus. The orbit was emptied of its contents and cauterized with actual cautery. At the end of two years there was no return of the growth in any part of the body. BURNETT.

In the study of these cases of monocular amblyopia usually associated with squint, De SCHWEINITZ (458) groups them as follows: (1) cases in which the visual field for form and color is normal or practically so, and where the accuracy of color perception at the macula or between it and the fixing point is unaffected; (2) cases characterized (*a*) by contraction of one or more of the color-fields, the form field remaining normal, and (*b*) by irregular contraction of both form- and color-fields sometimes associated with several of the red and blue lines; (3) cases with or without concentric contraction of the color- and form-fields, but associated (*a*) with diminished central color perception either at the point of fixation and surrounding it, or between it and the blind spot, or (*b*) with scotoma chiefly for colors. Several examples are given of each group. In cases of the first group there is some hope of improvement by education of the visual centre; in the second group there is but little hope of this; the third seem to resemble the hysterical forms of amblyopia. BURNETT.

The cases whose histories are given by BOOTH (459) were from the practice of Dr. David Webster, and were all (five in number) clearly marked instances of hysterical blindness, partial or complete. They were submitted to no other treatment than hypnotism, yet all except one recovered completely after from five to

twelve seances. The author suggests a trial of hypnotism as a first measure in the treatment in such cases. BURNETT.

XIX.—OPTIC NERVE.

460. KATZ. A case of partial recovery of vision after complete blindness lasting two weeks. *Wjest. Ophth.*, 1895, Nos. 4, 5.

461. KATZ. A case of recurrent inflammation of the optic nerve. *Ibid.*

462. ELSCHNIG. On inflammation of the optic nerves in cases of intra-cranial disease. *Mittheilungen des Vereins der Aertze in Steiermark*, No. 5, 1895.

463. PARINAUD. Contribution to the study of œdematous neuritis of intra-cranial origin. *Ann. d'ocul.*, cxiv., p. 5.

464. BUGGE. Atrophy of the optic nerve in its medico-legal aspects. *Norsk. Mag. f. Laegerid.*, Nos. 5 and 6; *Forhandl.*, p. 64.

465. WIEGMANN. A case of primary sarcoma of the optic nerve. *Zehender's klin. Monatsbl.*, xxxiii., p. 272.

466. SACHSALBER. On hyalin formations in the optic disc. Deutschmann's *Beiträge zur Augenheilkunde*, xxi.

467. EALES, HENRY. A case of bi-nasal hemianopia. *Ophth. Review*, xiv., p. 203.

468. WEBSTER, DAVID. A case of choked disc, the result of chronic cerebral meningitis, with autopsy. *The Ophth. Record*, June, 1895.

469. DODD, OSCAR. Hereditary retro-bulbar neuritis. *Annals of Ophth. and Otol.*, July, 1895.

In KATZ's (460) case there was retro-bulbar neuritis in both eyes, followed by intra-ocular neuritis, leading on the ninth day to complete blindness in the left, and on the eleventh day to complete blindness in the right eye. The swelling of the discs passed over into atrophy. Two weeks later the vision had improved so that fingers were counted R at 1½*m*, L at ¾ *m*.

HIRSCHMANN.

KATZ's (461) case was one of bilateral rheumatic retro-bulbar neuritis that recurred twice within three years. The vision decreased, and was restored. The discs, however, after the first attack, preserved their pale appearance. The field for white was normal, but for gray and colors was concentrically narrowed.

HIRSCHMANN.

ELSCHNIG (462) accepts Leber's view that choked disc and descending neuritis are a true neuritis, having nothing to do with the swelling which is a consequence of the inflammation, and being caused by phlogogenic substances from the tumor tissue. The author has studied a great quantity of anatomical and clinical material. In his anatomical studies he has found that choked disc is a true inflammation of the disc. The distention of the intervaginal space of the optic nerve is not constant in choked disc, and is often found without choked disc. A pure hydrops of the sheaths is not found with brain tumor, but is always in connection with a perineuritis. In every case of affection of the disc there is also an interstitial inflammation of the nerve trunk, particularly in the optic canal, but this inflammation occurs at various points, so that the assumption of the intra-ocular neuritis being a descending inflammation is not justified. With intracranial inflammations, retro-bulbar neuritis, in contradistinction to choked disc, is very frequent. In ninety per cent. of cases of brain tumor, and in perhaps one half of all cases of intra-cranial inflammation the optic discs are involved. This symptom is of great importance in cases of tumor, since it is often the first sign of the disease; in cases of inflammation retro-bulbar neuritis is an important symptom. The hypothetical phlogogenic substance has not been discovered, but the inflammation of the optic nerve and the meningitis, that are almost always present, prove that it exists.

The paper by PAIRNAUD (463) is based on the article by Rocho-Duvigneaud on the same subject. Pairnaud gives a general criticism of the theories of choked disc, and speaks in favor of his view, advanced fifteen years ago, that choked disc is primarily an œdema of the optic nerves brought about by the same conditions as œdema of the brain, of which the optic nerve is a prolongation. In most cases there exists also hydrocephalus and increased tension, but hydrops of the ventricles may be wanting. Increased intracranial pressure alone is not sufficient to produce choked disc. The investigations of Rocho-Duvigneaud have shown furthermore that the œdema, which is innocent at first, may later cause atrophy of the nerve fibres from sclerosis of the interstitial tissue. SULZER.

BUGGE'S (464) patient was run over by a bicyclist, and died in a few hours. The autopsy revealed a fracture with extensive extravasation, and on the base a sarcoma the size of a small hen's egg. The right optic tract was thinner than normal, the chiasm

flattened and soft, and the optic nerves, particularly the left, smaller than they should have been. With the microscope an extensive degeneration of the parts mentioned was found. Since it was possible to say, in the light of the autopsy, that the acuteness of vision and the extent of field must have been considerably affected, the cyclist was acquitted of the charge of having caused death through carelessness. SCHIÖTZ.

WIEGMANN'S (465) case is of interest, for although the optic nerve was involved for a distance of 3 *cm* in a pear-formed tumor, the vision was normal to the last. The tumor, a small-celled fibro-sarcoma, had its origin in the perineurium.

SACHSALBER (466) made a microscopic examination of the eyes of a woman having colloid formations in the optic discs, with vision $\frac{6}{9}$. The colloid masses of various shapes were found in different layers of the retina at some distance from the choroidal foramen, at the margin of the latter, in the disc proper, and behind the lamina cribrosa. The supporting framework of the nerve appeared homogeneous at some points, at others it showed a marked increase in cellular elements and nuclei. All the coats of the vessels were thickened, the adventitia particularly. From the microscopic condition of this and the other reported cases the author thinks that inflammatory changes play a certain role in the production of these colloid formations, but he does not accept the older view of Iwanoff that these arise like the colloid excrescences of the choroid.

The principal points of EALES'S (467) case were these: Patient, a man æt. seventy-five, sight failing eighteen months, after ill-health due to a whitlow. Hearing defective Optic discs showed sign of past chronic neuritis. Vision: R E $\frac{6}{9}$; L E $\frac{6}{12}$. Fields: binasal hemianopia with contraction of remaining halves, especially above. Knee-jerks exaggerated, hemianopic pupil in both eyes. Color vision apparently good over visual areas of fields. Urine indicative of cystitis. No Bright's disease.

WERNER.

The patient whose history and autopsy WEBSTER (468) records was a man twenty-eight years of age who had no syphilitic history and was not addicted to the excessive use of alcohol or tobacco. He had pronounced choked discs in both eyes and suffered with symptoms pointing to serious brain disease—such as headache, vomiting, difficult locomotion, etc. He died some nine months after he was first seen, and an autopsy showed several points of lymph on the vertex of the dura. Surface of the brain smooth,

convolutions flattened ; ventricles much distended, with a large amount of serum—8 or 10 ounces. No tumor or gross disease.

BURNETT.

In DODD'S (469) case, a girl of fourteen years, two months before she was first seen, suffered with frontal headaches and began to have impaired vision. Nothing special in the eyeground except large central excavation of disc. Vision was reduced to R $\frac{1}{200}$, L fingers at one foot. No scotoma, but some contraction of the V T F. After some months the nerve heads were atrophic and V = fingers at three feet in both. The only history in the family of eye trouble was that of a sister who had a progressive blindness, beginning at twelve years, which continued for some time, but stopped short of total blindness. This sister died at the age of thirty-four years. BURNETT.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

470. MÜLLER. On rupture of the sclero-corneal margin. A monograph. Vienna, 1895.

471. GAUTHIER. Filaria in the human eye. *Ann. de l'institut. chirurg. de Bruxelles*, 1895.

472. WOOD, CASEY A. Penetrating wounds of the eyeball. *Med. News*, Aug. 10, 1895.

473. SAUNDERS, R. M. A case of gunshot injury involving both eyes, studied nine years after the accident. *Annals of Ophth. and Otol.*, July, 1895.

474. BANISTER, J. M. A case of retention of a metallic splinter in a blind eye for seventeen years without the occurrence of sympathetic inflammation. *Ibid.*

MÜLLER (470), in a carefully composed and instructive monograph of 132 pages on injuries by blunt force, comes to the following conclusions : The ball is usually struck on the nasal side or above, and the cornea is chiefly ruptured in the young, and the sclera in the old. The indirect scleral rupture lies midway between the point at which the force is applied and the point of support in an arc uniting these two points. Schlemm's canal on account of the thinning of the wall there predisposes to rupture at that point. Partial rupture consists in the tearing of the sclera while the episclera is unaffected, and there is no reason to believe that the tearing begins first in the internal layers of the sclera to end in the outer. The lens in its uninjured capsule or

escaping from the capsule passes out of the eye usually behind the iris and in front of the ciliary body, rupturing the iris at its periphery. The prognosis of corneal rupture is more favorable than that of scleral rupture. A lens luxated under the conjunctiva should be removed after the scleral wound has healed, and if there is a slow irido-cyclitis the eye should be enucleated.

The result at which WOOD (472) has arrived from a study of various injuries to the eyeball is rather conservative. Injury to the ciliary region, even when some vision is left, he thinks an indication for prompt enucleation. Injuries, even penetrating ones, and especially those made by small shot, are to be treated tentatively by rest and antiseptics. If the foreign body has remained in the eye, and cannot be removed, the eye should be enucleated; if it has passed through the eyeball the eye should be watched and enucleated only when it shows signs of mischief.

BURNETT.

In the case reported by SAUNDERS (473), a boy of thirteen years was injured by the discharge of a shotgun. Both eyes were struck. The left was penetrated, and the shot evidently remained in the interior of the eye. This eye was lost, but was not enucleated, and nine years after was found to be quiet and causing no trouble in the fellow-eye. At the time of the accident a shot was found sticking in the sclera at the outer canthus. The ophthalmoscope showed a discolored and congested disc, many streaks of lymph and small clot in the vitreous, a slight detachment of retina at the lower portion. Vision was $\frac{5}{12}$ at that time. Nine years after, an examination showed changes in the fundus which makes it almost certain that a shot had entered the eye at the lower part, traversed the vitreous, and passed out again just above the disc. Vision is now $\frac{20}{20}$, and has been the same since about five months after the accident. BURNETT.

The interest of BANISTER'S (474) case lies in this that a piece of steel 3 *mm* in length by 1 *mm* in thickness remained in an atrophied eye for seventeen years without causing any trouble in the fellow-eye, but at the end of that period set up sympathetic inflammation. BURNETT.

XXI.—OCULAR DISTURBANCES IN GENERAL AFFECTIONS.

475. ROCHON-DUVIGNEAUD. A contribution to the study of œdematous neuritis of intra-cranial origin. *Arch. d'opht.*, XV., p. 401.

476. MASIUS. On the production of amaurosis by the ethereal extract of male fern. *Acad. de méd. de Belgique*, June 29, 1895; and *Ann. d'ocul.*, cxiv., p. 127.

477. BOEDEKER. On acute alcoholic ophthalmoplegia. *Arch. f. Psych.*, 1895, p. 811.

478. KERSCHBAUMER, R. On the leucæmic affections of the eye. *Graefe's Arch.*, xli., p. 99.

479. GERMANN. A case of chronic neuralgia in the region of the first branch of the trigeminus caused by empyema of the maxillary antrum. Symptoms resembling those of glaucoma. *St. Petersburgh med. Wochenschr*, 1895, No. 8.

480. JANSEN. Optic aphasia in a case of otitic meningitis over the left temporal lobe ending in recovery. *Deutsche med. Wochenschr.*, 1895.

481. GINSBERG. Clinical notes. *Wjest. Ophth.*, 1895, No. 4.

482. FRIDENBERG. On a case of Graves's disease, with monocular exophthalmus and unilateral hypertrophy of the thyroid. *Graefe's Arch.*, xiv., 3, p. 158.

483. VIALET. Oculo-pupillary disturbances in a case of unilateral syringo-myelitis. *Rec. d'opht.*, 1895, p. 529.

ROCHON-DAVIGNEAUD (475) had the opportunity of making an autopsy on two patients with typical choked disc from cerebral glioma. In the trunk of the optic nerves, in the first case, as well as in the sheaths, there were traces of existing or pre-existing inflammation, and atrophy most marked near the disc but extending into the optic tract. The disc was swollen, but less with œdema than with fibres rich in nuclei. There was also peri-vasculitis, but this did not extend back behind the lamina cribrosa. In the second case there was marked thickening of the chiasm and of the nerves, due in the case of the nerves to an œdema of the neuroglia sheaths and a marked increase in the number of glia cells. The connective-tissue septa and the vessels were normal. The swollen disc showed the same sort of cellular infiltration as the nerves. The adventitia of the larger vessels was thickened and sclerosed up to the lamina cribrosa. v. MITTELSTÄDT.

In two anchylostoma cases in which eight to ten grammes of ethereal extract of male fern were taken daily for several days, MASIUS (476) saw excessive amaurosis develop. In order to determine whether the amaurosis was due to the anchylostoma anæmia or to the drug, he administered the latter to four dogs, two of which became blind in a short time. SULZER.

On the grounds of personal investigations and extended study of the literature, BOEDEKER (477) concludes that the actual morbid process is a hemorrhagic encephalitis in the region of the peduncles, and that this causes all the clinical symptoms.

KERSCHBAUMER (478) had the opportunity of examining the organs of a man of twenty-five, dead of lymphatic leucæmia, who had in life come to the clinic complaining of diplopia. Both eyes were prominent and there was severe pain in the orbits. The lids of both eyes were swollen. There was choked disc in one and tortuous retinal veins in the other. The infiltrations found in various parts of the body and which had involved the entire orbits were best studied in the region of the right lobe of the thyroid. Here there were found: (1) small round cells smaller than leucocytes and having two nuclei for the most part, (2) round cells similar to leucocytes, (3) large cells with lustrous protoplasm, (4) large star-shaped cells, (5) isolated giant-cells, (6) red blood corpuscles, (7) scattered nuclei, and (8) detritus. As in other cases, microbes were found: (*a*) short bacilli with rounded ends and of various sizes, (*b*) isolated groups of cocci. What rôle these microbes had played is uncertain.

The round cells may have came into the various parts of the body from the spleen and lymphatic glands, being carried by the blood-vessels. In the interior of the vessels and about their walls the cells were deposited in various quantities. It is impossible to say whether the cells outside of the vessels came there by diapedesis or whether they were the expression of a lymph stasis.

GERMANN'S (479) patient, on whom an iridectomy had been done by another surgeon, had a contraction of the field which had probably led to the erroneous diagnosis. All symptoms disappeared on washing out the antrum.

In a case of typical syringo-myelitis, VIALET (483) found the following ocular anomalies: sinking in of the left eyeball, with narrowing of the palpebral fissure, left-sided myosis, and right-sided mydriasis—in other words, left-sided paralysis of the sympathetic from involvement of the cilio-spinal centre.

BOOK NOTICE.

Epidemic Ophthalmia: its symptoms, diagnosis, and management, with papers upon allied subjects, by SYDNEY STEPHENSON, M.B., F.R.C.S. Ed. Octavo, pp. 278, with a number of illustrations and one colored plate. Young J. Pentland, Edinburgh and London.

Discussions upon school ophthalmia, and upon the nature, management, and prevention of contagious ophthalmia in schools and almshouses, have been frequent in Great Britain in the last few years, and the agitation has led to the adoption of improved hygienic measures. The present book is a résumé of the entire subject, from the standpoint of the clinician, based upon the extensive literature and the author's own researches, and it will be welcomed particularly by the medical officers of public institutions. The author takes up acute muco-purulent ophthalmia, purulent ophthalmia, diphtheritic ophthalmia, and trachoma, going extensively into the history of the epidemics of trachoma, and fully discussing all the moot-points, such as its contagiousness, its distinction from folliculosis, and the like, and devoting considerable space to its treatment and to the surgical treatment of the lid deformities following it. Rules are laid down for the examination of persons who are to be admitted to public institutions, and for the periodic inspection of the inmates. An appendix upon washing and bathing in public institutions and upon the accessories of the bath contains many valuable practical points.

W. A. H.

MISCELLANEOUS NOTES

The **Manhattan Eye and Ear Hospital** has received a legacy of $10,000 from the late Mr. GEO. BLISS of New York.

The **N. Y. Ophthalmic and Aural Institute** has received a legacy of $2,000 from the late Mrs. MARY PUTNAM BULL, of Tarrytown, N. Y.

The **German Ophthalmological Society** will meet at Heidelberg, August 6th, 7th, and 8th.

APPOINTMENTS.

Dr. JAS. C. BLOOMFIELD has been elected Resident Surgeon, and Dr. A. G. THOMSON, Assistant Surgeon, to the Wills Eye Hospital, Philadelphia.

Dr. F. B. EATON of Portland, Oregon, has settled in San José, California.

Obituary.

I. Dr. J. F. NOYES, the pioneer ophthalmologist of the great Northwest, and for years the Professor of Eye Surgery in the District Medical College, died at the age of seventy-eight. He was a member of the American Ophthalmic Society, a competent oculist, a gentleman of pleasant manners, refined taste, and benevolent character.

II. Dr. TATZUYA INOUYE.[1]—The death of Tatzuya Inouye deprives us of one of the foremost ophthalmologists of Japan. In the last thirty years medical science and practice in Japan have been in the process of reorganization under the influence of European civilization; during this period, medical knowledge, which had previously scarcely extended beyond quackery, has been changed by modern and exact scientific principles. The deceased deserves the credit of having done the most and the best to produce this change, especially in ophthalmology.

Inouye was born in Shikoku in the province of Tokushima (Awa), July 21, 1847. For seven generations his ancestors had devoted themselves to the profession of medicine. His father was physician to the princes of Awa and also enjoyed a good reputation in the surrounding country. At the age of fifteen, Tatzuya Inouye entered the school which in feudal times served especially for the education of the sons of vassals; here he received Japanese and Chinese instruction. Three years later he took up the study of medicine under his father's direction, this being the usual custom in acquiring medical education at that time.

[1] Though the death of Dr. T. Inouye has been briefly noticed in our last volume (page 556) our readers will doubtless appreciate a more detailed biography of the first scientific ophthalmologist of Japan.

In the meanwhile, the feudal reign had been abolished and the imperial government inaugurated. The latter founded a medical institute in the new capital, Tokio, from which grew the present medical faculty of the Imperial University. Entering this institute in 1870, Inouye first became acquainted with modern scientific medicine, and devoted himself to his studies with extraordinary zeal.

After pursuing the prescribed course of study, he resolved to devote himself to ophthalmology exclusively. In 1876 the eye-patients were removed from the surgical wards, and a separate ophthalmological division was founded in the Imperial University. Inouye was the right man for this place, and here he began his career as a teacher; in 1880 he was appointed assistant professor, and the following year he was made professor. Besides achieving this position, he had acquired an extensive private practice, and had built a large ophthalmic hospital, which was the first of its kind in Japan.

He resigned the professorship at the University in 1882 so as to be able to concentrate all his energy upon his clinical work. In 1885 he devoted a year to study in Europe and America, where he met the most noted ophthalmologists and visited the best institutions. Returning to Japan, he continued his clinical work in even more extensive and successful a manner. He acquired so great a reputation that his clinic became the Mecca of all eye-patients of Japan.

His great operative skill probably found its best illustration in the management of difficult cases of cataract. He not only excelled in practical work, but also occupied an enviable position in scientific spheres. Among his writings, the following are deserving of special mention: *Hygiene of the Eye*, 1882; *The Operation for Squint*, 1887; *A Note-Book for Ophthalmologists; An Atlas of Ophthalmology* (new edition, 1894); *The Use of the Ophthalmoscope*, 1895. Among the new or improved apparatus and instruments introduced by the deceased may be mentioned: An apparatus for irrigating the anterior chamber in cataract extraction; an apparatus for measuring the dimensions and depth of foreign bodies in the vitreous and retina; a cataract knife; a sterilization vessel and room for aseptic operations; a modified iris forceps; an iris knife for very shallow anterior chambers: a knife for detaching the iris; a steam sterilizing apparatus; a tatooing needle; a corneal loupe (magnifying 60 diameters); and an irrigating apparatus of special service in

blennorrhœa. He made use of a new method of scleral section in operating upon corneal staphyloma, etc. He also published an annual report of the interesting and important results and experiences of his clinic.

In 1889 he organized Inouye's Ophthalmological Society, which issues periodically a journal full of rich ophthalmological contents. In his clinic he conducted a course of instruction for specialists, the popularity of which was shown by a constant attendance of from forty to fifty. As a matter of fact, the majority of Japanese oculists of the present time have received their special training in his clinic.

Tatzuya Inouye was a man of firm character and indefatigable energy—a necessary combination in one who developed and accomplished so great a work of education without any support or assistance. Brusqueness was one of his attributes, but it was a severity tempered by humane principles which the hard, outer covering could not hide. His patients looked up to him as a child does to its father, and cherished the most faithful recollections of him. His mode of life was the personification of simplicity and economy. On the other hand, he did not shrink from great outlays if these were necessary for scientific purposes. To the poor and weak he always extended a helping hand; and to promising young physicians without means he gave material support; there are not a few who thank this benevolent protector for having placed them in the medical profession.

Whilst riding on July 10, 1895, he met with an accident which terminated fatally five days later. He was forty-eight years old when he died.

Thus passed away a deserving man, an indefatigable worker in science, and an irreplaceable teacher and leader of the ophthalmological world of Japan, which is indebted to him chiefly for its present development.

If, unfortunately, the planter was not spared for a long life, may, at least, the tree which under his guidance developed to such luxurious growth, continue to thrive and blossom, and serve as a lasting tower and monument to his memory!

III. Dr. James Pleasant Parker, founder and editor of the *Annals of Ophthalmology and Otology*, died in St. Louis, Feb. 6, 1896, after seven weeks' illness, in his 42d year. After several years' experience as a pharmacist, he entered the Jefferson Medical College in 1882, graduated in 1886, and studied ophthalmology and otol-

ogy in Philadelphia and New York. He first settled in Kansas City, but moved to St Louis in 1892. The *Annals*, now in their fifth year, are continued, among others, by Dr. CASEY A. WOOD, of Chicago, for the ophthalmological, and Dr. T. MELVILLE HARDIE, of Chicago, for the otological, rhinological, and laryngological department.

Contents of the last number of the Arch. f. Augenhk.

Vol. XXXII., No. 2. Issued March, 1896.

A.—Originals:

C. MELLINGER. Subconjunctival Injections of Chloride of Sodium Solutions.

HEDDAENS. Haab's Cortical Reflex of the Pupil and the Hemiopic Pupillary Reaction.

P. SILEX. Partial Paresis of the Orbicular Muscles.

L. BACH. On G. Ahlström's Paper on the Antiseptic Action of the Tears.

O. WALTER. Sarcomas of the Ciliary Body.

E. FUCHS. Retinitis Punctata Albescens, and Atrophia Gyrata of Choroid and Retina.

SIKLOSSY, Jr. Blepharoplasty after Fricke.

B.—Translations:

The English Originals of our Vol. XXIV., Nos. 3 and 4. The papers of C. WEILAND, M. BLACK, J. DUNN, H. GIFFORD, A. N. ALLING, H. MOULTON, B. MILLIKIN, ZENTMAYER and POSEY, H. BURNHAM, W. A. HOLDEN, H. GRADLE, J. GUTTMANN, D. BROSE, E. HECKEL, A. DUANE. (By Dr. R. GREEF.)

C.—Report on Progress:

Third Quarter of 1895. Translated in this number.

ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement:

Dr. ST. BERNHEIMER, of Vienna.

1. *General Ophthalmological Literature:*
   - *a.*—Text-books (not abstracts, but notes pointing out what is new and characteristic).
   - *b.*—Monographs and papers on historical, statistical, and general subjects; reports on societies and hospitals.
   - *c.*—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. *General Pathology, Diagnosis, and Therapeutics*, including new instruments, apparatus, and remedies.
3. *Normal Anatomy and Physiology*, including color-blindness.

Dr. C. HORSTMANN, Prof. at the University of Berlin (Potsdamer Strasse 4):

1. *Anomalies of Refraction and Accommodation.*
2. *Eyelids.*
3. *Lachrymal Apparatus.*
4. *Muscles and Nerves.*
5. *Orbit and Adjacent Cavities.*
6. *Conjunctiva, Cornea, Sclerotic.*
7. *Injuries and Foreign Bodies of these parts.*

Dr. P SILEX, Lecturer at the University of Berlin.

1. *Uveal Tract*, including glaucoma.
2. *Refracting Media*, including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement which we think of paramount importance.

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The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

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